EXPRESS5800/320La/320La-R

NEC

User's Guide

EXPRESS5800/320La/320La-R

User's Guide

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Using This Guide

This User's Guide provides a quick reference to information about your fault-tolerant server system. Its goal is to familiarize you with your system and the tasks necessary for system configuring and upgrading.

This guide contains the following information:

- Chapter 1, **"**System Overview" provides an overview of your system and describes your system's major system components. See this chapter to familiarize yourself with your system.
- Chapter 2, "Setting Up Your System" tells you how to select a site, unpack the system, assemble the rack-mount system, make cable connections, and how to use your system.
- Chapter 3, "Configuring Your System" tells you how to configure the system and provides instructions for running the BIOS Setup Utility and the Fast!Util Configuration Utility, which is used to configure SCSI devices in your system. This chapter also provides information on system board jumper settings.
- Chapter 4, "CRU Replacement and Server Upgrades" provides you with instructions on how you can access, remove, and install Customer-Replaceable Units (CRUs) and directions for upgrading your server system with additional processors, optional memory, options cards, peripheral devices, and redundant power supply.
- Chapter 5, "Problem Solving" contains helpful information for solving problems that might occur with your system.
- Appendix A, "Specifications" provides specifications for your server unit.
- Appendix B, "ROMPilot BIOS Error Codes" defines the ROMPilot Error Codes reported to the BIOS. These codes can be used for reference when diagnosing situations where the ROMPilot installation fails.
- "Glossary" defines the standard acronyms and technical terms used in this manual.

Text Conventions

This guide uses the following text conventions.

Warnings, cautions, and notes have the following meanings:

WARNING

Warnings alert you to situations that could result in serious personal injury or loss of life.

CAUTION

Cautions indicate situations that can damage the system hardware or software.

Note: Notes give important information about the material being described.

- Names of keyboard keys are printed as they appear on the keyboard. For example, **Ctrl**, **Alt**, or **Enter**.
- Text or keystrokes that you enter appear as boldface type. For example, type **abc123** and press **ENTER**.
- File names are printed in uppercase letters. For example, AUTOEXEC.BAT.

Related Documents

In addition to this guide, the following system documentation is included with your server either as electronic files on EXPRESSBUILDER or as paper copy shipped with your server.

- *System Release Notes*
  Release Notes provide you with the latest information about your system. This information was not available to be included in your user's guide at the time it was developed and released.
- *Getting Started Sheet*
  The Getting Started Sheet provides several easy-to-follow steps to become familiar with your server documentation and to complete your installation successfully.
- *EXPRESSBUILDER User's Guide*
  The EXPRESSBUILDER User's Guide contains the instructions needed for reloading the operating system (OS) and installing ESMPRO and MWA support programs.
- *ServerCare^{SM} Guide*
  The ServerCare Guide contains information about NEC's warranty and server registration.

Safety Notices

- **Caution:** To reduce the risk of electric shock which could cause personal injury, follow all safety notices. The symbols shown are used in your documentation and on your equipment to indicate safety hazards.
- **Warning:** Lithium batteries can be dangerous. Improper handling of lithium batteries may result in an explosion. Dispose of lithium batteries as required by local ordinance or as normal waste if no local ordinance exists.
- **Warning:** The detachable power supply cords are intended to serve as the disconnect devices.
- **Warning:** This equipment has a 3-wire, grounded power cords. To prevent electrical hazards, do not remove or defeat the ground prong on the power cords. Replace a power cord if it gets damaged. Contact your dealer for an exact replacement.
- **Warning:** The DC push-button on/off switch on the front panel does not turn off the system AC power. Also, +5vdc is present on the system board whenever the AC power cords are connected between the system and an AC outlet. Before doing the procedures in this manual, make sure that your system is powered off and unplug the AC power cords from the back of the chassis. Failure to disconnect power before opening your system can result in personal injury and equipment damage.

In the U.S.A. and Canada, the power cord must be a UL-listed detachable power cord (in Canada, CSA-certified), type ST or SJT, 16 AWG, 3-conductor, provided with a molded-on NEMA type 5-15 P plug cap at one end and a molded-on cord connector body at the other end. The cord length must not exceed 9 feet (2.7 meters).

Outside the U.S.A. and Canada, the plug must be rated for 250 VAC, 10 amp minimum, and must display an international agency approval marking. The cord must be suitable for use in the end-user country. Consult your dealer or the local electrical authorities if you are unsure of the type of power cord to use in your country. The voltage change occurs via a switch in the power supply.

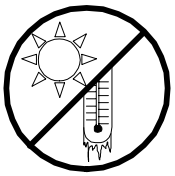
- **Warning:** Under no circumstances should the user attempt to disassemble the power supply. The power supply has no user-replaceable parts. Inside the power supply are hazardous voltages that can cause serious personal injury. A defective power supply must be returned to your dealer.

Safety Notices for Users Outside of the U.S.A. and Canada

- **PELV (Protected Extra-Low Voltage) Integrity:** To ensure the extra-low voltage integrity of the equipment, connect only equipment with mains-protected electrically-compatible circuits to the external ports.
- **Remote Earths:** To prevent electrical shock, connect all local (individual office) computers and computer support equipment to the same electrical circuit of the building wiring. If you are unsure, check the building wiring to avoid remote earth conditions.
- **Earth Bonding:** For safe operation, only connect the equipment to a building supply that is in accordance with current wiring regulations in your country. In the U.K., those regulations are the IEE.

Care and Handling

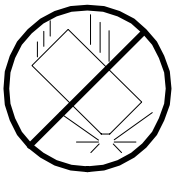
Use the following guidelines to properly handle and care for your system.



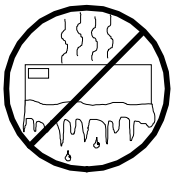
Protect the system from extremely low or high temperatures. Let the system warm (or cool) to room temperature before using it.

Keep the system away from magnetic forces.

Keep the system dry. Do not wash the system with a wet cloth or pour fluid into it.



Protect the system from being bumped or dropped.



Check the system for condensation. If condensation exists, allow it to evaporate before powering on the system.

Keep the system away from dust, sand, and dirt.

1

System Overview

- Overview
- Fault-Tolerant Hardware
- System Chassis
- System Components and Module Set
- System Features

Overview

This server is well suited for Symmetric Multiprocessing (SMP) and Enterprise class network server environments and is a highly reliable, high-powered, fault-tolerant, high-capacity multiprocessing system based on the Intel® Pentium III® processor family. It is a fully redundant system with on-line serviceability and hot plug replacement of all major subsystems and a solid performer offering the latest technology. The server system is conveniently housed and available as a tower-based system, including housing for the tape drive module (see Figure 1-1) or as a rack-mount system, without housing for the tape drive module (see Figure 1-2) in a relatively small form factor of 8U (fits into a standard EIA 19-inch rack assembly.)

The combination of mirrored computing performance, memory capacity, and integrated I/O provides a high performance environment for many applications including network servers. The server system is designed for use in applications where fault-tolerant, advanced technology, high performance, and high levels of reliability and compatibility are expected.

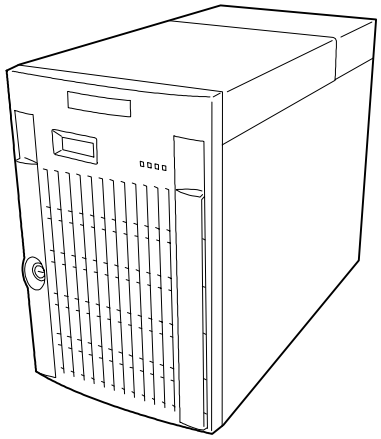


Figure 1-1. Tower-Based System

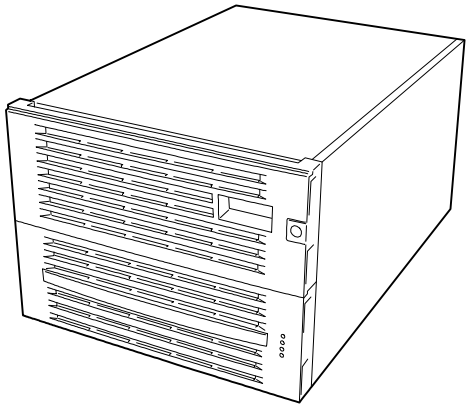


Figure 1-2. Rack-Mount System

This server system is designed for full redundancy and hot plug replacement of all major subsystems. The system modules that can be replaced are identified as Customer Replaceable Units (CRUs) of which most are redundant and hot pluggable. To this end, the server includes or has the option to include the following:

- Two self-contained power supplies that provide redundant power (i.e., the system will continue to operate with a single power supply failure) and are hot swappable. The two power supplies are easily installed or removed from the back of the chassis without turning the system power off.
- Cooling system redundancy where the system will continue to operate in the event of a fan failure and the redundant fans will switch to maximum operating speed.
- SCSI hard disk drive bays accessible from the front of the chassis.
- Hot-swap SCSI disk drive backplane; a failed drive can be removed and replaced with a new drive without system power being turned off.
- High degree of SCSI disk fault tolerance and advanced disk array management features.
- Video Graphics Array (VGA) controller with 4 MB of video memory (occupies one PCI slot per PCI module).
- SCSI disk adapter providing dual channel Ultra 160 SCSI interfaces for the hot swap hard disk drives.
- Embedded single channel enhanced IDE adapter providing interface for peripheral devices (CD-ROM and super floppy disk drive).
- Integrated onboard Network Interface Controller (NIC), an Intel 82559 PCI LAN adapter for 10 or 100 Mbps Ethernet networks with a RJ-45 Ethernet connector.
- Storage module that holds up to six hot-swap SCSI hard disk drives (three logical disks).
- SCSI backpanel is Ultra2 capable.
- Integrated dual Universal Serial Bus (USB) ports that include support for the keyboard and mouse.
- Hardware monitors (temperature, fans, and voltage) and software monitors to indicate failures.
- Hardware monitors (temperature and voltage) and software monitors to indicate failures.
- Easy access to all parts for service.

As application requirements increase, you can expand your server system with additional processors, additional memory, add-in boards and peripheral devices.

Your server system features the following major components:

- Up to two high-performance 800 MHz Pentium III processors in a CPU module.
- Up to 2 GB of Synchronous Dynamic Random-Access (SDRAM) system memory in a CPU module.
- Four PCI expansion slots, which support 32 bit PCI adapter cards in a PCI module.

Fault-Tolerant Hardware

The hardware architecture of the system provides fault tolerance transparency. If a hardware component fails, the application program continues processing and is never aware that a failure occurred.

To provide system redundancy this system uses dual hardware technology. That means that all major components are mirrored within a single hardware chassis. Group #1 is on the left-hand side of the chassis and Group #2 is on the right-hand side of the chassis, as viewed from the front of the chassis, see Figure 1-3. There are two CPU modules and each CPU module is operating in lockstep (performing the same instructions at the same time) with the other as a single system. Thus, if a failure occurs in one CPU module the other CPU module will continue to operate with no interruption, no loss of data, and system performance is not affected. Note that the PCI module, PCI adapters, and power supplies are also paired for system redundancy.

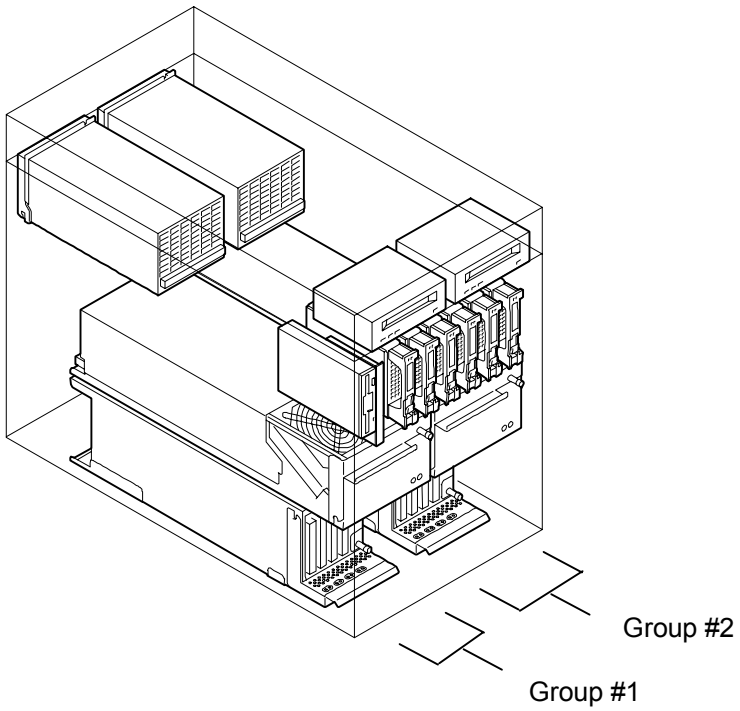


Figure 1-3. Dual Hardware Fault-Tolerant Tower-Based System

System Chassis

The system chassis is an easy-to-expand, fabricated metal structure. The following subsections describe the system chassis external view, internal view, and the system board set.

External View

Figure 1-5 shows the front chassis features and controls. Figure 1-6 shows the rear chassis features and controls. Figure 1-7 shows the optional tape drive bay kit components features and controls on the rear of the chassis.

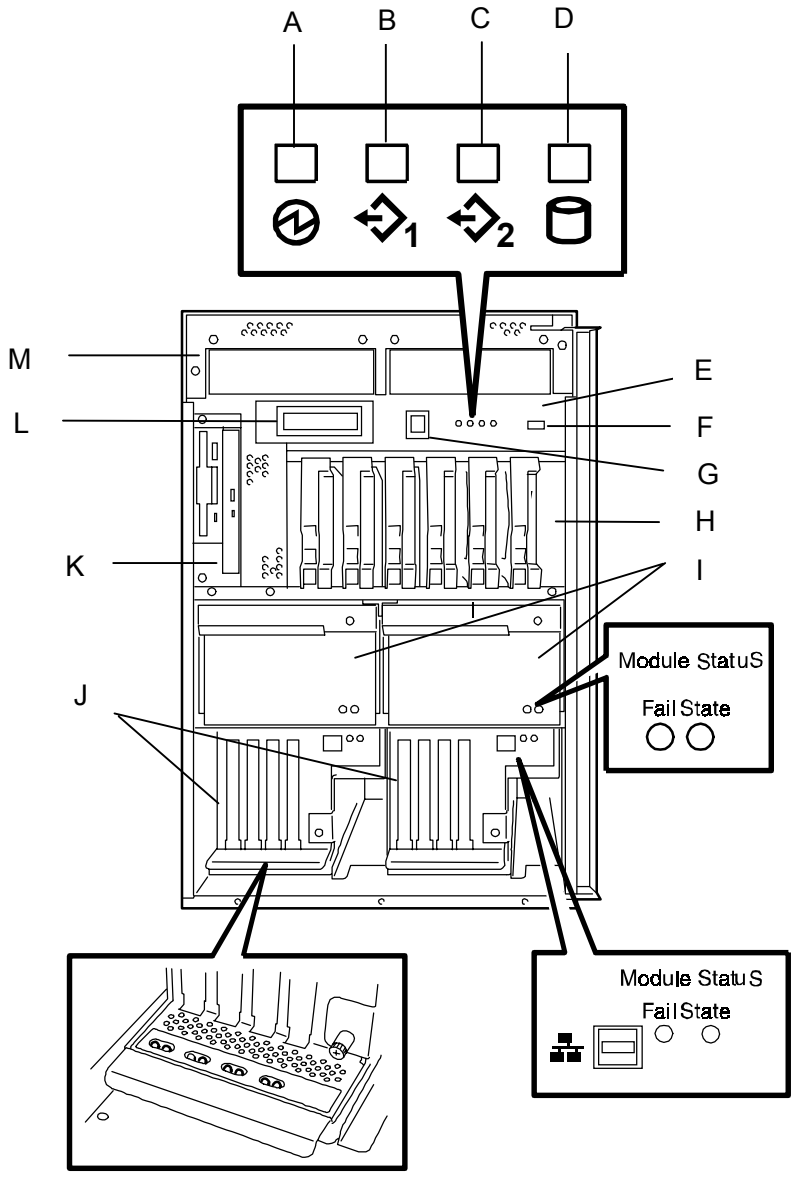
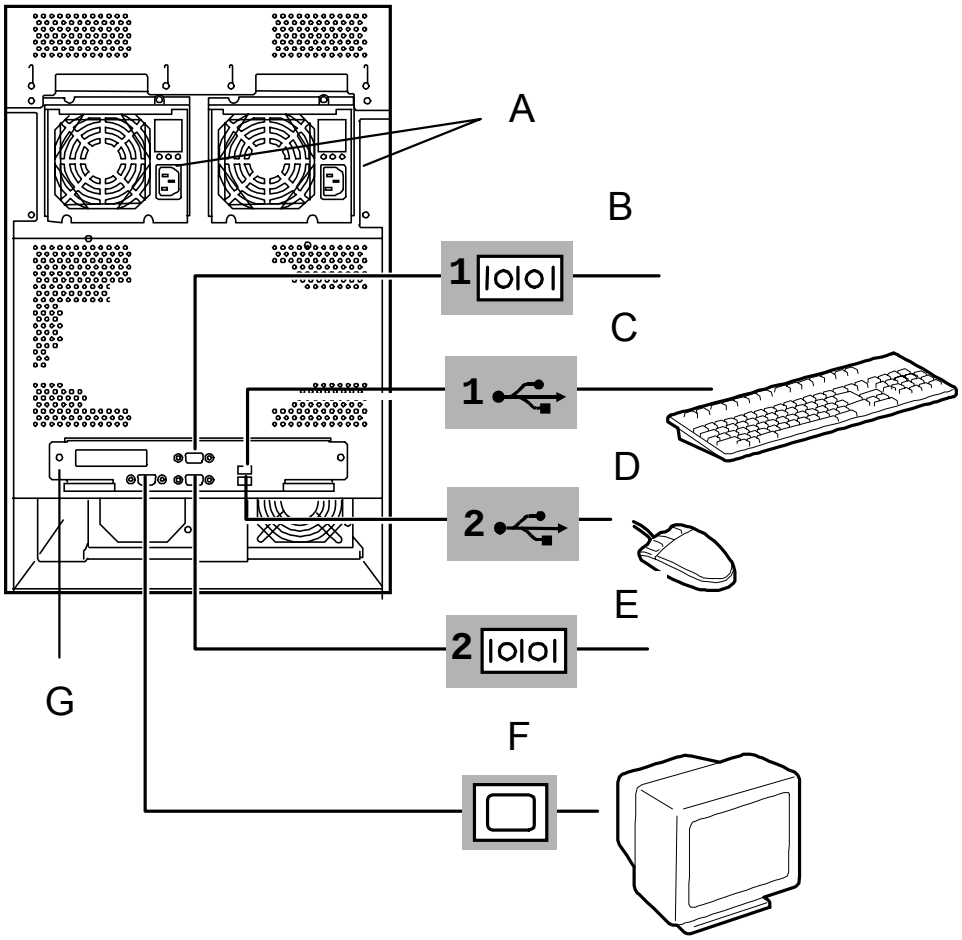


Figure 1-4. Front Chassis Features and Controls

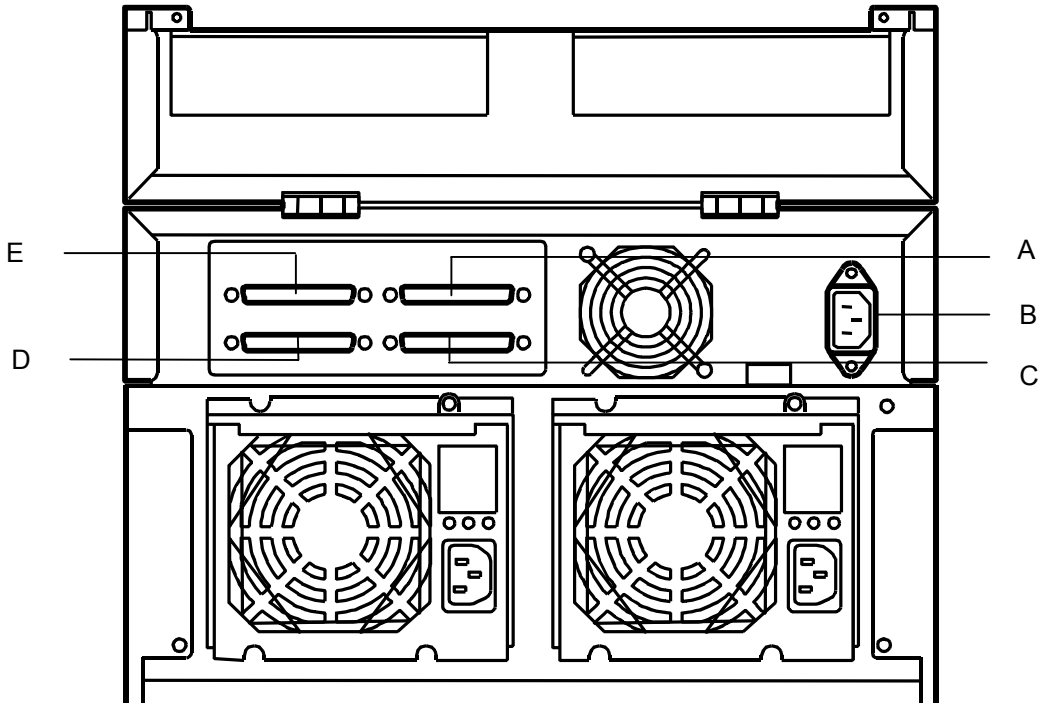
A – System power LED	When green, system power is on. When off, system power is off.
B – Status 1 LED (group 1) Tower: Left side of system Rack: Top of system	When green, the Group 1 PCI- and CPU-modules are operating normally. See Table 1-1 for a list and description of the system status LED indicators.
C – Status 2 LED (group 2) Tower: Right side of system Rack: Bottom of system	When green, the Group 1 PCI- and CPU-CPU modules are operating normally. See Table 1-1 for a list and description of the system status LED indicators.
D – Disk activity LED	When green, internal disk drives are being accessed. See Table 1-1 for a list and description of the system status LED indicators.
E – Front panel	Panel contains the LCD, the system power button, four LEDs, and a USB port.
F – USB port	USB connector jack used for debug only
G – System power button	Press to turn system DC power on or off.
H – SCSI hard disk drive bays (storage bays)	Each slot in a bay can contain one hot-pluggable 3.5-inch disk drive. The slots are numbered 1 – 6 left to right (numbers are not SCSI IDs). SCSI IDs are 0, 1, and 2 for each group of three disk drives. The drives are mirrored as follows: 1 – 4, 2 – 5, and 3 – 6. Each drive has two status LEDs. Refer to Table 1-2 for information on disk drive status LED panel indicators.
I – CPU modules	Two CPU modules providing Dual Modular Redundancy (DMR). The CPU modules are numbered 1 – 2 left to right. Each CPU module contains one or two processors and a maximum of up to 2 GB of SDRAM memory. Refer to Table 1-3 for information on CPU module status LED indicators.
J – PCI modules with PCI adapters	Two hot-pluggable PCI modules. The PCI modules are numbered 1 – 2 left to right. Each PCI module contains four PCI adapter card slots and two embedded adapters (LAN and SCSI disk). Each module has a pair of status LEDs and a LAN port. See Table 1-4 for a list and description of the PCI module status LED indicators. See Table 1-5 for a list and description of the PCI adapter-slot status LEDs.
K – Device module	Houses an IDE 24X CD-ROM drive and 3.5-inch IDE high-capacity (120 MB) super (floppy) disk drive (not hot pluggable).
L – Liquid Crystal Display (LCD)	A 2-line, 16-character display. Displays system event messages: ■ Startup ■ Self-test ■ Normal operating ■ Alarm conditions See Chapter 5 for a list and description of the system event messages.
M – Tape drive module (tower system only)	Houses the optional tape drive bay kit (that includes a 75 watt power supply) and up to two optional 5.25-inch tape drives. The tape drives are numbered 1 – 2, left to right.

Figure 1-5. Front Chassis Features and Controls (Continued)



A – Power supplies	Two standard 450-watt power supplies. The power supplies are numbered 1 – 2, right to left from the rear of the system. Each power supply has three status LED indicators. Refer to Table 1-6 for information on the power supply LED indicators.
B – COM1	COM1 serial port 9-pin connector (for UPS option).
C – Keyboard	USB port 1.
D – Mouse	USB port 2.
E – COM2	COM2 serial port 9-pin connector (for external modem option).
F – VGA (monitor)	VGA monitor 15-pin connector.
G – I/O panel	Contains two USB ports, one VGA port, and two serial ports (COM1 and COM2).

Figure 1-6. Rear Chassis Features and Controls



A – External SCSI Device #1 Output Port	External SCSI output port for tape drive #1.
B – AC Input Plug	AC input plug for 75-watt power supply.
C – External SCSI Device #1 Input Port	External SCSI input port for tape drive #1.
D – External SCSI Device #2 Input Port	External SCSI input port for tape drive #2.
E – External SCSI Device #2 Output Port	External SCSI output port for tape drive #2.

Figure 1-7. Optional Tape Drive Bay Kit Rear Chassis Features and Controls

Status LED Indicator Descriptions

Table 1-1 lists the system status LED indicators along with a description of each LED indicator. Table 1-2 lists the disk drive status LED panel indicators along with a description of each LED indicator. Table 1-3 lists the CPU module status LED indicators along with a description of each LED indicator. Table 1-4 lists the PCI module status LED indicators along with a description of each LED indicator. Table 1-5 lists the PCI adapter-slot status indicators along with a description of each LED indicator. Table 1-6 lists the power supply status LED panel indicators along with a description of each LED indicator.

The access LED indicators for the CD-ROM drive and the diskette drive light when access is being made to the media in the drive.

Table 1-1. System Status LED Indicators

LED	Status	Description	Response
System Power	Off	Power OFF	None required (normal)
	Green	Power ON	None required (normal)
Status 1 and Status 2	Off	AC Power OFF	None required (normal)
		Power-On Self-Test (POST) is running	None required (normal)
		Status 1 OFF	Check Status 2
		Status 2 OFF	Check Status 1
		CPU bus error	Turn system off and on. If error appears during POST, record the error condition and contact your technical support representative.
		ISA-bus I/O check error	Turn system off and on. If error appears during POST, record the error condition and contact your technical support representative.
	Green (Steady light)	PCI and CPU modules are operating normally	None required (normal)
	Green (Flashing light)	CPU or PCI module is operating in simplex mode	None required (normal)
	Amber	Critical temperature alarm	If error exists, record the error condition and contact your technical support representative.
		Critical voltage alarm	Check condition
	Amber (Flashing light)	Noncritical temperature alarm	Check condition
		Noncritical voltage alarm	Check condition
		Fan alarm	Check condition
		Detected device failure	Contact your technical support representative.
		Detected error with redundant power supply	Check power supply status LED indicators, see Table 1-6.
	Red	BMC failure	One of the PCI modules is not installed.
Disk Activity	Off	Not accessing disk drives	None required (normal)
	Amber	Internal disk drive failure	Check disk drive status LEDs
	Green	Accessing disk drives	None required (normal)

Table 1-2. Disk Drive Status LED Panel Indicators

LED	Status	Description	Response
Disk Drive Power	Off	Disk drive power off	Remount the disk drive
	Green	Disk drive power on	None required (normal)
	Green (Flashing light)**	Accessing disk drive	None required (normal)
Disk Drive Error	Off	No Fault	None required (normal)
	Amber (Steady light)	Disk drive failure*	Replace disk drive
	(Flashing light)	Rebuilding*	None required (normal)

*Software controlled.
**Blinks off during disk access.

Table 1-3. CPU Module Status LED Indicators

Fail LED	State LED	Description	Response
Off	Green	Both CPU modules are operating normally.	None required (normal)
Off	Amber	CPU module in simplex mode is operating normally.	None required (normal)
Red	Green	CPU module is executing online power-on self-test (POST)	None required (normal)
Red	Amber	System is dumping memory to disk.	None required (normal)
Red	OFF	Standby (No DC, AC only) or CPU module failure	Turn on system power or Replace CPU module.
OFF	OFF	No power to CPU module.	Check that the module is properly installed. Also, check both power supplies and power cords.

Table 1-4. PCI module Status LED Indicators

Fail LED	State Status	Description	Response
Off	Green	Both PCI modules are operating normally.	None required (normal)
Off	Amber	PCI module in simplex mode is operating normally. Other PCI module is offline.	Place the offline PCI module online so that the system is running in duplex mode.
Off	Off	No power to PCI module.	Check that the module is properly installed. Also, check both power supplies and power cords.
Red	Green	PCI module is running POST.	None required (normal)
Red	Off	Standby mode. (No DC power, AC power only)	Turn on system power.
		PCI module failure	Check that the module is properly installed. If the condition persists, contact your technical support representative.

Table 1-5. PCI Adapter-Slot Status LED Indicators

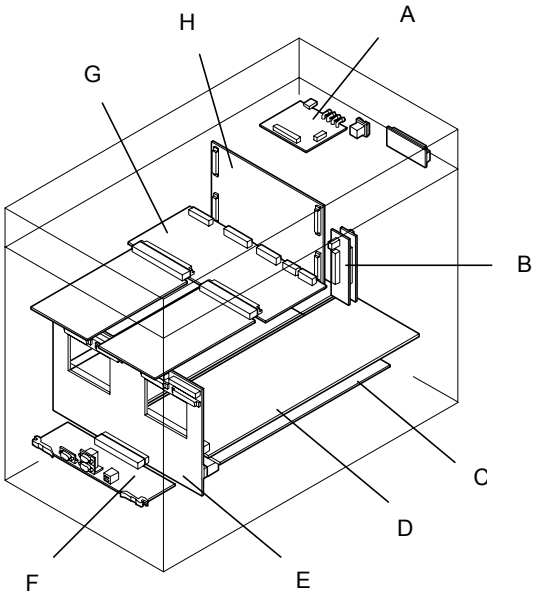
Fail LED	State LED	Description	Response
Off	Amber	PCI adapter is running in simplex mode.	Install identical PCI adapter in corresponding slot in the other PCI module.
Off	Green	POST or PCI adapter is running in duplex mode.	None required (normal)
Off	Off	PCI adapters are not installed or are not installed correctly.	Install PCI adapters.
Red	Off	PCI adapter is installed correctly but not working or offline.	Place the PCI adapter online.
Red	Amber	PCI adapter being tested under software control or preparing for operation.	Wait for the LED indicator to change. If the LED indicator does not change, check the status of the adapter.
Red	Green	Memory dump request is being issued or diagnostics are running.	Wait until the memory dump or diagnostics are finished.

Table 1-6. Power Supply Status LED Indicators

LED			Description	Response
Power	**Pre-Fail**	**Fail**		
Off	Off	Off	No AC power.	Check that AC power is available at the wall outlet. Check that the system power cords are properly connected to the power supplies and the AC wall outlets.
Green (Flashing light)	Off	Off	AC present and Standby On.	None required (normal)
Green	Off	Off	Power supply DC On and OK	None required (normal)
Off	Off	Amber	Power supply failed.	Replace the power supply.
Green	Off	Amber (Flashing light)	Current limit	None required (normal)
Green	Amber (Flashing light)	Off	Fan failure.	Replace power supply.

Internal Board View

Figure 1-8 shows the major boards and backplanes inside the server.



A	Front panel board
B	Device backplane (IDE device relay boards)
C	PCI board (located in PCI module)
D	CPU board (located in CPU module)
E	Main Backplane board
F	I/O panel board
G	Power backplane
H	SCSI backplane

Figure 1-8 Major Boards and Backplanes Inside the Server

Customer Replaceable Units (CRUs)

Certain hardware components within the server are defined as Customer Replaceable Units (CRUs) of which most are hot-pluggable and redundant. Table 1-8 lists the CRUs and whether they are hot pluggable or redundant hardware components.

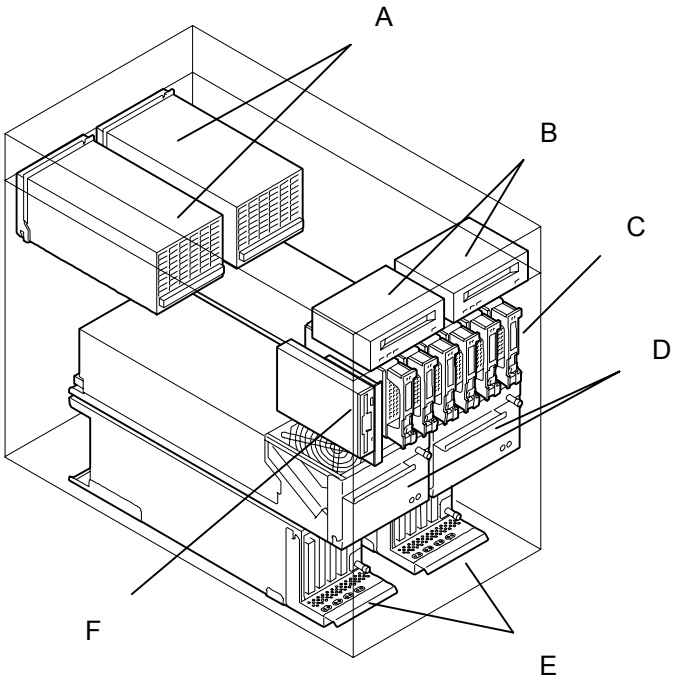
Table 1-7. Customer Replaceable Units (CRUs)

CRU	Redundant	Hot Pluggable
CPU module	Yes	Yes
Device module	No	No
PCI module	Yes	Yes
Power supply	Yes	Yes
PCI adapter cards	Yes*	No
Hard disk drives	Yes	Yes

* Only if PCI adapter cards are identical in both PCI modules.

System Components and Module Set

The system components and module set inside the server are show in Figure 1-9.



A	Power supplies
B	Optional tape drives
C	Storage bays
D	CPU modules
E	PCI modules
F	Device module

Figure 1-9 System Components and Module Set Inside the Server

Power Supplies

The server has two standard 450-Watt power supplies. Each supply has autoranging input 50/60 Hz and automatically switches between the following input voltage ranges:

- 100-127 VAC at 50/60 Hz; 7.6 A maximum current
- 200-240 VAC at 50/60 Hz; 3.8 A maximum current

The power supplies are numbered 1 and 2, right to left as seen from the rear of the system. Both power supplies are CRUs and are hot pluggable and redundant. Each power supply has three status indicators that are listed along with a description of each in Table 1-6.

CPU Modules

The server has two CPU modules that provide Dual Modular Redundancy (DMR). The CPU modules are numbered 1 and 2, left to right as seen from the front of the system. Each CPU module has two status indicators that are listed along with a description of each in Table 1-3. Table 1-8 summarizes the features of a CPU module.

Table 1-8. Features of the CPU Module

Feature	Description
Upgradable multiple processor slots	Two processor sockets are available on the CPU board for one or two processors.
Upgradable memory	Four DIMM sockets on the CPU board. Can contain a minimum of 256 MB up to a maximum of 2 GB of Synchronous Dynamic Random-Access (SDRAM) system memory.
SMP	Supports two-way Symmetric Multiprocessing (SMP) when two processors are installed.
Fan	Two integrated fans that provide cooling for both the CPU module and hard disk drives.

The system runs identical applications in both CPU modules in lockstep. Thus, if one CPU module fails, the second CPU module takes over the processing without any interruption to the current application running on the system. Note that this type of failure is transparent to the user.

In simplex mode the system is operating with only one CPU module and one PCI module. Thus, the failure of one CPU module or one PCI module causes the whole system to fail. A fault-tolerant system should not run in the simplex mode for any longer than necessary for upgrading or repair.

Storage Bays

The server has a storage area containing six storage bays that support six hard disk drives (three logical disks). The hard disk drives are CRUs, hot pluggable, and redundant. The disk slots are physically numbered 1 – 6, left to right as seen from the front of the system. The disk drives SCSI ID numbers are 0, 1, 2 for each group of logical disk drives and the first mirrored pairs are physical drives 1 and 4 that contain the boot software, as shown below.

Group 1			**Group 2**		
SCSI ID 0	SCSI ID 1	SCSI ID 2	**SCSI ID 0**	SCSI ID 1	SCSI ID 2
Disk #1	Disk #2	Disk #3	**Disk #4**	Disk #5	Disk #6

For true dual modular redundancy, all the disk drives must be mirrored in the system, as shown below.

Mirrored Drives	
Drive	Drive
1	4
2	5
3	6

All the disk drives must be added in pairs and only similar disks can mirror each other. Figure 1-10.

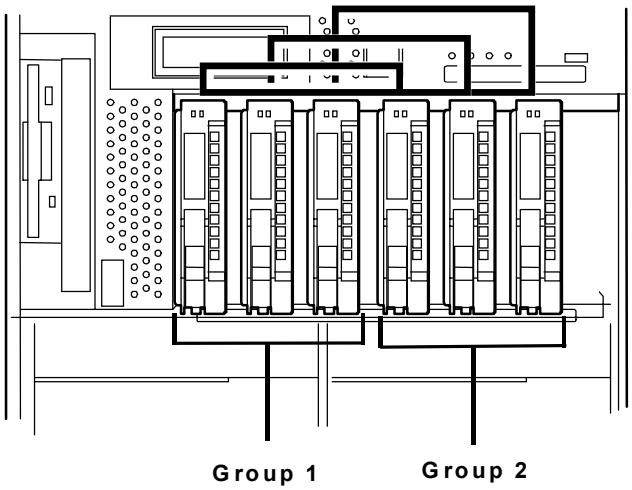


Figure 1-10. Mirrored Hard Disk Drives

Table 1-9 summarizes the features of storage bays and hard disk drives.

Table 1-9. Features of the Storage Bays and Hard Disk Drives

Feature	Description
Disk drives	Hot pluggable and redundant.
Disk drive speeds and storage capacity	Disk drive spindle speeds of 10,000 RPM. Storage capacities of 18, or 36 GB.
Disk drive carrier	Each disk drive is mounted in a disk drive carrier containing a handle, latching mechanism, and two status indicators. The status indicators are listed along with a description of each in Table 1-2.
Storage bays	The storage bays can contain any combination of disk drive carriers and dummy disk drive carriers as long as equivalent drives are mirrored. DO NOT remove dummy disk drive carriers from unused slots. They are present to direct airflow around the devices.

PCI modules

The server has two PCI modules that are CRUs, hot pluggable, and fault-tolerant. Each PCI module contains a PCI board that transfers data from PCI devices to the CPU. The PCI module is fault-tolerant such that if one stops functioning the other PCI module takes over.

The PCI modules are numbered 1 and 2, left to right as seen from the front of the system. Each PCI module has two status indicators that are listed along with a description of each in Table 1-4. Table 1-10 summarizes the features of a PCI module.

Table 1-10. Features of the PCI module

Feature	Description
PCI slots	Four PCI expansion card slots are available in the PCI module. Note that Slot 1 is reserved for a graphics video card or the SMM card.
Embedded adapters	Two embedded adapters are available as follows: – LAN – SCSI disk
Network port	One Ethernet port for connecting to a network from the embedded LAN adapter.

PCI Adapter Cards

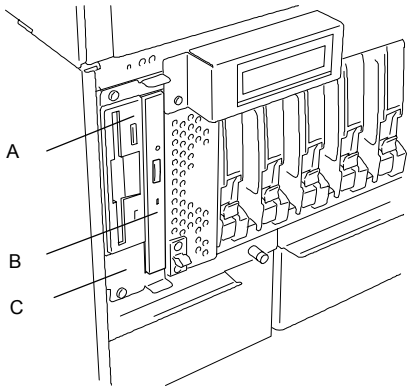
For fault-tolerant systems the 32 bit PCI adapter cards must be installed in the PCI modules as redundant pairs. This is so that if a PCI card fails in one PCI module its equivalent PCI card in the other PCI module takes over the I/O operation without the processing being interrupted or having any loss of data or performance.

Located on the bottom front of each PCI module are PCI adapter-slot status LEDs that monitor the status of each PCI card. See Table 1-5 for a list and description of these PCI adapter-slot status LEDs.

Device Module

The device module supports two standard PC AT compatible peripheral devices (see Figure 1-11), as follows:

- One IDE 3.5-inch high-capacity super floppy disk drive (supports 720 KB, 1.44 MB, and 120 MB diskette media).
- One 24X CD-ROM drive.



A High-capacity super floppy disk drive
B 24X CD-ROM drive
C Device module

Figure 1-11. Device Module

The device module is a single CRU that is not hot-pluggable.

Optional Components

Optional components are described in the following subsections.

Tape Drives

In the tower system only, two tape drive module bays are available for mounting optional half-height 5.25-inch tape drives. As a prerequisite to installing the optional tape drives an optional internal device bay kit must be installed first.

The tape drives are numbered 1 and 2, left to right as viewed from the front of the system.

Monitor, Keyboard, and Mouse

The system does not require a monitor, keyboard, or mouse for most server management functions other than the initial boot, system upgrading, or system troubleshooting.

USB-compatible keyboard and mouse connectors are available on the rear of the system.

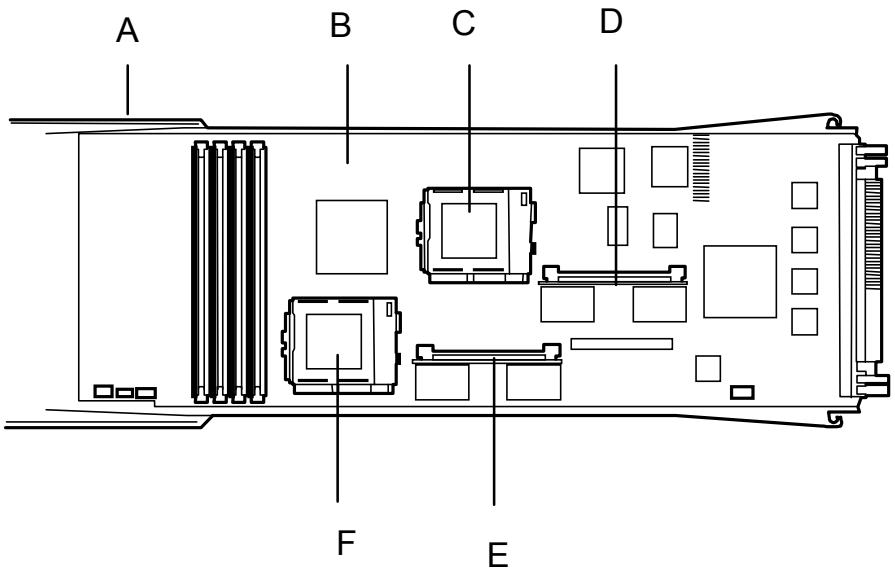
Support for a colored VGA monitor is also available by using the VGA monitor connector available on the rear of the system.

System Features

The following subsections provide a description of the system features.

Pentium III Processor

Depending on system configuration, each CPU CRU can include up to two Pentium *III* 800 MHz processors, see Figure 1-12. Each Pentium *III* processor is mounted on the CPU board located in the CPU module. The primary processor plugs into a Zero Insertion Force (ZIF) socket on the board. The processor features a 256 KB cache. An optional second Pentium processor *III* enhances performance and allows Symmetric Multiprocessing (SMP*)*.



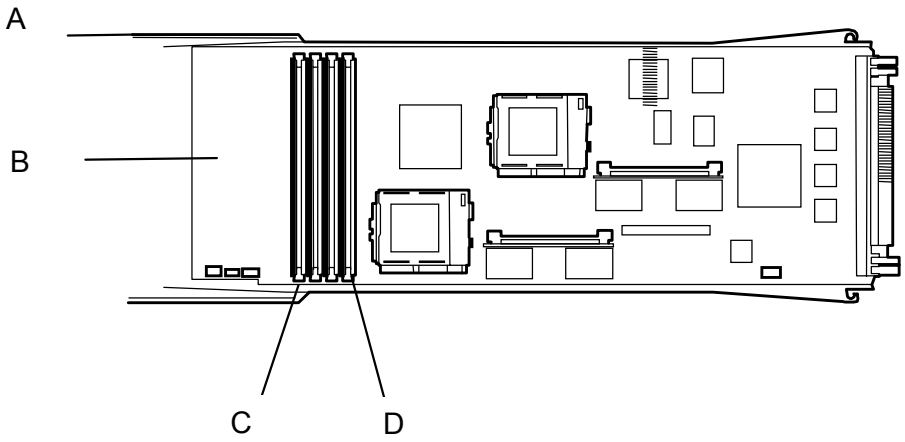
A CPU module
B CPU board
C Primary processor
D Voltage regulator for primary processor
E Voltage regulator for secondary processor
F Secondary processor

Figure 1-12. Processor Locations on the CPU Board

System Memory

Up to 2 GB of Synchronous Dynamic Random-Access Memory (SDRAM) can be configured on the CPU board located in the CPU module. The CPU board contains four 168-pin DIMM sockets allowing for system memory expansion within a CPU module. See Figure 1-13

> **Note:** Only use DIMMs approved for use in this server system. Call your customer service representative for information.



A CPU module
B CPU board
C Memory socket #1
D Memory socket #4

Figure 1-13. DIMM Locations on the CPU Board

SAF-TE Controller

The SCSI Backplane has two SAF-TE (SCSI Accessed Fault Tolerant Enclosure) controllers that provide an interface to a disk subsystem that supports status signals, hot swapping drives, and module monitoring.

The transport mechanism for the standardized alert detection and status reporting is the SCSI bus. Disk drives, power supplies, cooling fans, and temperature are continually monitored and the conditions then reported over the SCSI bus to the system. This allows the user to react to conditions that could normally go unnoticed until data loss.

BIOS

The BIOS and Setup Utility are located in the Flash EPROM on the CPU board and include support for system setup and legacy device configuration. A number of security, reliability, and management features also have been incorporated to meet vital server needs.

USB/IDE Controller

The ServerWorks ROSB chip supports the USB and IDE controllers. The I/O panel board provides the connector interface for two USB ports that support the keyboard and mouse.

The system includes a single channel enhanced IDE 32 bit interface. The IDE controller provides support for the internally mounted CD-ROM and super floppy disk drive.

The device controls:

- PIO and DMA transfer modes
- Mode 4 timings
- Transfer rates up to 33 MB/s
- Buffering for PCI/IDE burst transfers.

Network Controller

Each PCI CRU includes a 10BASE-T/100BASE-TX network controller based on the Intel 82559 Fast Ethernet Network Interface ASIC. As a PCI bus master, the controller can burst data at up to 132 MB/sec. The controller contains two receive and transmit FIFO buffers that prevent data overruns or underruns while waiting for access to the PCI bus. The controller has the following:

- 32-bit PCI bus master interface (direct drive of bus), compatible with *PCI Bus Specification, Revision 2.1*
- Chained memory structure with improved dynamic transmit chaining for enhanced performance
- Programmable transmit threshold for improved bus utilization
- Early receive interrupt for concurrent processing of receive data
- On-chip counters for network management
- Autodetect and autoswitching for 10 or 100 Mbps network speeds
- Support for both 10 Mbps and 100 Mbps networks, capable of full or half duplex, with back-to-back transmit at 100 Mbps
- Support for Wake On LAN.

SCSI Controller

The PCI board includes an embedded QLogic ISP12160A SCSI dual channel controller for supporting the hard disk drives in the storage bays. It is a 64-bit direct memory access (DMA) bus master and supports 32-bit PCI buses at 33 MHz. This SCSI controller interfaces the PCI bus to two Ultra 160 SCSI buses. The SCSI controller is fully autonomous and capable of managing multiple I/O operations and data transfers without host intervention.

Video Controller

The system has an integrated Intel 69000 HiQVideo™ Accelerator highly integrated graphics controller that supports the following:

- BIOS compatibility with 1/4VGA, VGA, SVGA, XGA, and SXGA
- 2 MB of onboard synchronous DRAM (SDRAM) embedded memory
- Superb 2D video performance
- Analog VGA monitors (single and multiple frequency, interlaced and noninterlaced) with a maximum vertical retrace noninterlaced frequency of 100 Hz.

Peripheral Controller

The Super I/O PC97317 integrated peripheral controller supports two enhanced serial ports (UARTs) and an integrated Real Time Clock (RTC) module. The I/O panel board provides the connector interface for each serial port.

Serial Ports

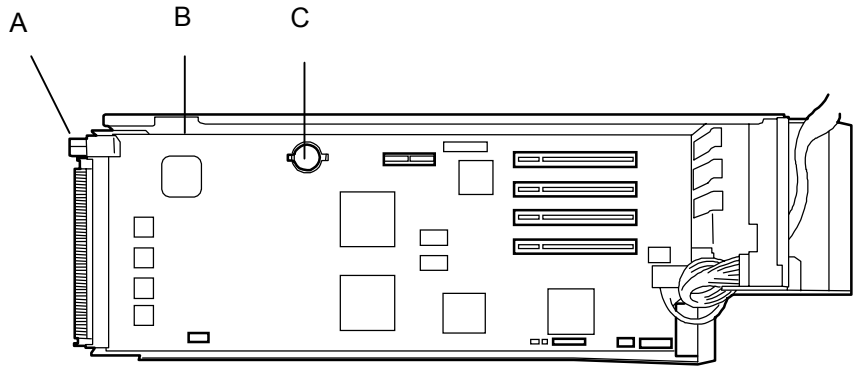
The serial ports (UART1 and UART 2) provide data rates up to 1.5 Mbaud and 13 IRQ channel options. When disabled, serial port interrupts are available to add-in boards.

Real Time Clock

The real-time clock (RTC), which is located in the PCI module on the PCI board, provides system clock/calendar information stored in a non-volatile memory (NVRAM). The real-time clock battery provides power backup for the real-time clock. See Figure 1-14.

The RTC battery may need to be replaced because of its battery life span. The battery powers the clock in the absence of power. When the battery starts to weaken, it loses voltage, and the system settings stored in CMOS RAM (for example, the date and time) may be wrong.

The RTC battery (Vendor Part No. CR2032) is available through many vendors. Contact your sales representative or dealer for a list of approved devices.



A PCI module
B PCI board
C Real-time clock battery

Figure 1-14. Real-Time Clock Battery

Baseboard Management Controllers (BMC)

Server management is concentrated in the Baseboard Management Controllers (BMC). The BMCs and associated circuitry are powered from a 5Vdc standby voltage, which remains active when system power is switched off, but the ac power source is still on and connected.

The BMC supports the Management Workstation Application (MWA), which allows remote server management via a modem, LAN, or direct connection to a manager system. Events monitored by the manager system include over-temperature and over-voltage conditions, fan failure, or chassis intrusion.

Information on the Management Workstation Application (MWA) in the ESMPRO Suite User's Guide on the ESMPRO CD-ROM.

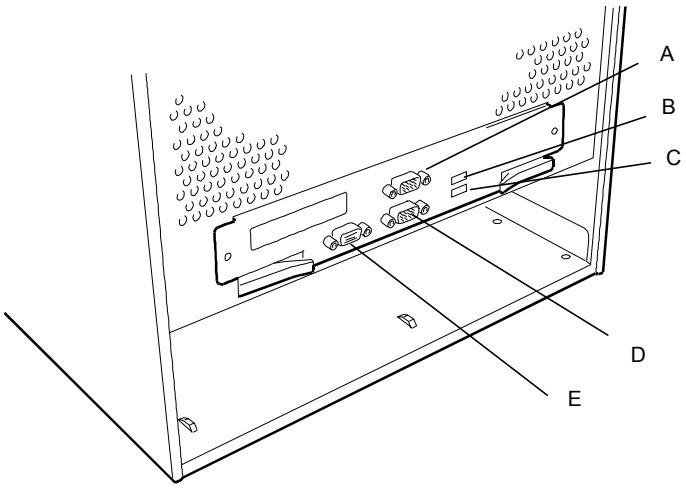
One major function of the BMC is to autonomously monitor system management events, and log their occurrence in the nonvolatile System Event Log (SEL). The events being monitored include overtemperature and overvoltage conditions, fan failure, or chassis intrusion. To enable accurate monitoring, the BMC maintains the nonvolatile Sensor Data Record (SDR), from which sensor information can be retrieved. The BMC provides an ISA host interface to SDR sensor information, so that software running on the server can poll and retrieve the server's current status.

The BMC performs the following:

- Monitors server board temperature and voltage
- Monitors processor presence and controls Fault Resilient Boot (FRB)
- Detects and indicates baseboard fan failure
- Manages the SEL interface
- Manages the SDR Repository interface
- Monitors the SDR/SEL timestamp clock
- Monitors the system management watchdog timer
- Monitors the periodic SMI timer
- Monitors the event receiver
- Controls secure mode, including video blanking, diskette write-protect monitoring, and front panel lock/unlock initiation
- Controls Wake On LAN via Magic Packet support.

External Device Connectors

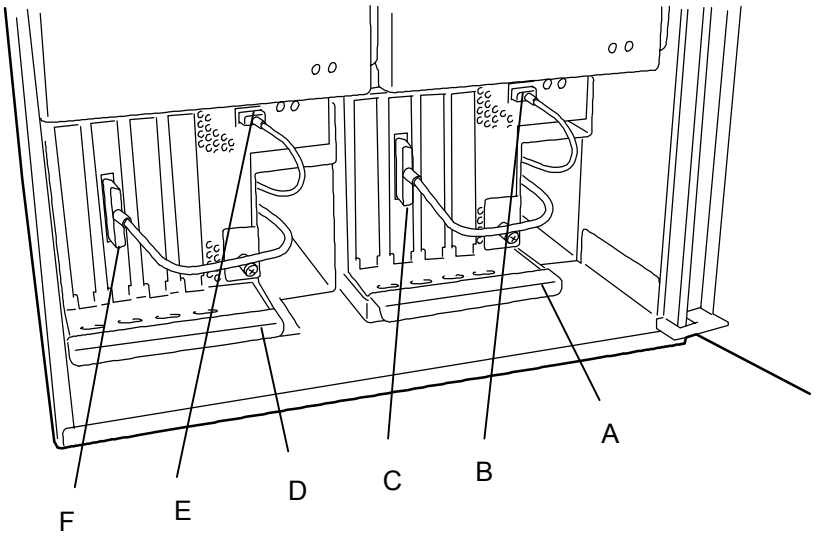
The external device I/O connectors located on the I/O panel board (see Figure 1-15) provide support for two USB ports that support a mouse and a keyboard, two serial port connectors, and a VGA monitor port.



A COM1 serial port (for UPS option)
B USB port 1 (for keyboard)
C USB port 2 (for mouse)
D COM2 serial port (for external modem option)
E VGA monitor port

Figure 1-15. I/O Panel External Connectors

The external device I/O connectors located on each PCI module (see Figure 1-16) provide support for a LAN port and PCI board device ports.



A PCI module 2
B External LAN port
C External PCI device connector
D PCI module 1
E External LAN port
F External PCI device connector

Figure 1-16. PCI module External Connectors

2

Setting Up the System

- Overview
- Selecting a Site
- Unpacking the System
- Rack-Mount System Assembly
- Getting Familiar with the System
- Making Connections
- Connecting the Power Cord(s)
- Using the System

Overview

This chapter describes how to select a site, unpack the system, make cable connections, and power on the tower-based or rack-mount system units. Also, provided are the instructions for assembling the rack-mount system unit.

Selecting a Site

The system operates reliably in a typical office environment. Choose a site that is:

- Near grounded, three-pronged power outlets.

Note: For the United States and Canada, this means a NEMA 5-15R outlets for 100-120 VAC or NEMA 6-15R outlets for 200-240 VAC. For other international sites, this means three-pronged power outlets applicable for the electrical code of the region.

⚠ WARNING

Be sure the power service connection is through a properly grounded outlet.

⚠ CAUTION

The power plug from each of the power supplies must be plugged into the same common ground power outlets.

- Clean, dust-free, and well ventilated. Front and rear ventilating openings kept free of obstructions. Away from sources of heat, vibration or physical shock.
- Isolated from strong electromagnetic fields and electrical noise produced by electrical devices (such as air conditioners, large fans, large electric motors, radio and TV transmitters, and high-frequency security devices)
- Spacious enough to provide at least 15 inches (38.1 centimeters) behind and on each side of the system and at least 32 inches (81.3 centimeters) in front of the system for proper cooling, airflow, and cable clearance.
- Easily accessible for system maintenance and installation of system upgrades.

Unpacking the System

⚠ WARNING

Your system weighs approximately 132 pounds (60 kg). If your system contains numerous optional boards and peripheral devices, it will weigh more. To avoid personal injury, make sure you have someone help you lift or move the system.

When you receive your system if the shipping boxes are damaged, note the damage, and if possible, photograph it for reference. After removing the contents of the containers, keep the cartons and the packing materials. If the contents appear damaged when you unpack the boxes, file a damage claim with the carrier immediately.

Rack-Mount System Assembly

This section provides the instructions for assembling the rack-mount server unit into a standard EIA 19-inch rack cabinet.

Unpacking the Rack Mounting Hardware

Although the rack mounting hardware is inspected and carefully packaged at the factory, damage may occur during shipping. Follow these steps for unpacking.

1. Visually inspect the shipping containers; notify your carrier immediately of any damage.
2. Carefully remove the rack mounting hardware and verify the parts. See Figure 2-1 and Table 2-1. If parts are missing or the hardware is damaged, notify your service representative.

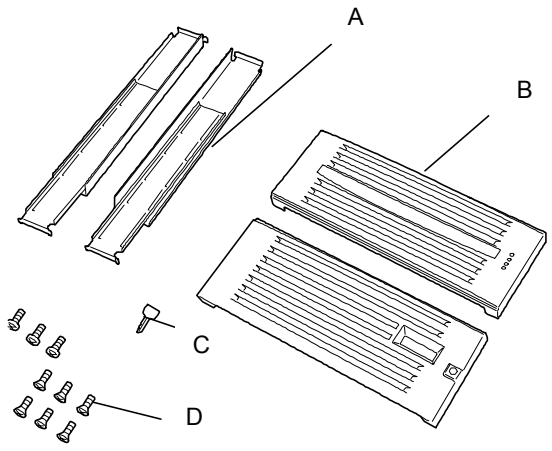


Figure 2-1. Rack Mounting Hardware

Table 2-1. Rack Mount Parts

Reference	Description
A	Rail Assemblies (2)
B	Front Bezel (Top and Bottom Panels)
C	Key
D	Miscellaneous Hardware

Before You Begin

Before you begin, please review the following cautions, warnings, and general guidelines.

⚠ WARNING

Be sure that power to the system is turned off and unplugged. All voltage is removed only when the power cords are unplugged.

- Avoid excessive vibration and shock. Dropping an electronic component can cause serious damage.
- Do not disconnect or remove parts other than those specified in the procedure.
- Do not touch I/O connector pins.
- All screws are Phillips-head, unless otherwise specified.
- On completion of any assembly or reassembly, perform a power-on test. If a fault occurs, verify that the assembly or reassembly was performed correctly. If the problem persists, see "Problem Solving" in Chapter 5.

Static Precautions

An electrostatic discharge (ESD) can damage disk drives, option boards, and other components. You can provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground when handling system components.

Electronic devices can be easily damaged by static electricity. To prevent damage, keep them in their protective packaging when they are not installed in your system.

Assembly

The following subsection describes how to assemble your rack-mount server unit into a standard EIA 19-inch rack cabinet.

⚠ CAUTION

Ensure that the location of the rack-mount server unit does not create an unstable condition when installed in the rack cabinet.

Before you begin select an appropriate location in your rack cabinet for the rack-mount server unit. To improve rack stability, mount heavier items towards the bottom of the rack cabinet. If the rack is a stand-alone unit and the rack is more than 75% filled with components, consider installing an optional stabilizer kit.

Note: When planning your system configuration for the rack cabinet you should consider the length of the cables that interconnect system components.

⚠ WARNING

ANCHOR THE EQUIPMENT RACK: The equipment rack must be anchored to an unmovable support to prevent it from falling over when one or more servers are extended in front of it on slide assemblies. The anchors must be able to withstand a force of up to 113 kg (250 lbs.) You must also consider the weight of any other device installed in the rack.

MAIN AC POWER DISCONNECT: You are responsible for installing an AC power disconnect for the entire rack unit. This main disconnect must be readily accessible, and it must be labeled as controlling power to the entire unit, not just to the server(s).

GROUNDING THE RACK INSTALLATION: To avoid the potential for an electrical shock hazard, you must include a third wire safety grounding conductor with the rack installation. If a server power cord is plugged into an AC outlet that is part of the rack, then you must provide proper grounding for the rack itself. If server power cords are plugged into wall AC outlets, the safety grounding conductor in each power cord provides proper grounding only for the server. You must provide additional, proper grounding for the rack and other devices installed in it.

⚠ CAUTION

Temperature: The operating temperature of the server unit, when installed in an equipment rack, must not go below 5 °C (41 °F) or rise above 35 °C (95 °F). Extreme fluctuations in temperature can cause a variety of problems in your server. It is recommended that the ambient temperature for a rack-mount unit not exceed 25°C.

Ventilation: The equipment rack must provide sufficient airflow to the front of the server unit to maintain proper cooling. It must also include ventilation sufficient to exhaust a maximum of 3,000 Btu's per hour for the server. The rack selected and the ventilation provided must be suitable to the environment in which the server will be used.

Mounting the Rail Assemblies into the Rack Cabinet

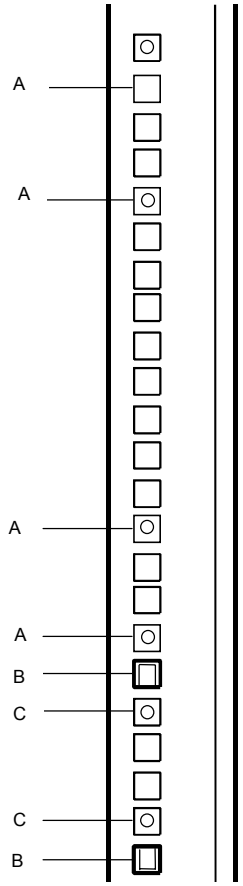
Before you can mount the server unit in the rack cabinet, you must install the rail assemblies in the rack cabinet.

Note: You must use the following procedure to prepare the rack cabinet before mounting the server unit into it. Observe all safety precautions, warnings, and cautions noted throughout this chapter.

Use the following procedure to install the rail assemblies into the rack cabinet.

1. Determine where you want to install the server unit in the rack cabinet.
   - To improve rack stability, mount the server unit towards the bottom of the rack cabinet.
   - If there are units already installed, install the server unit into the next empty space from the bottom of the rack cabinet.
2. Starting at the bottom of the rack cabinet, or at the top or bottom of a previously mounted unit, measure the number of screw hole locations on the front vertical mounting rails and rear vertical mounting rails (see Figure 2-2) for the rail assemblies. Mark the location with a pencil on the outside of both the front and rear vertical mounting rails.

Note: For vertical reference, every three screw holes on the rack vertical mounting rail are equal to 1U (1.75 inches).



A – M5 Cagenuts for ServerUnit Faceplate
B – Rail Assembly Bracket Alignment Tabs
C – Rail Assembly Bracket M5 Screw Holes

Figure 2-2. Locating and Marking the Front Mounting Holes for the Server Unit

3. While marking the hole locations for the rail assemblies, also mark the locations on the front vertical mounting rails for the cage nuts, which hold the thumbscrews of the server faceplate (see Figure 2-2).

4. Insert six M5 cage nuts in their marked locations on the front vertical mounting rails (see Figure 2-3), as follows:

- Position the cage nut on the inside of the front vertical mounting rails.
- Hook the side lip of a cage nut into the square hole in the rail.
- Squeeze while pressing the other side lip of the cage nut into the square hole in the rail until it is secured.
- Repeat for each cage nut.

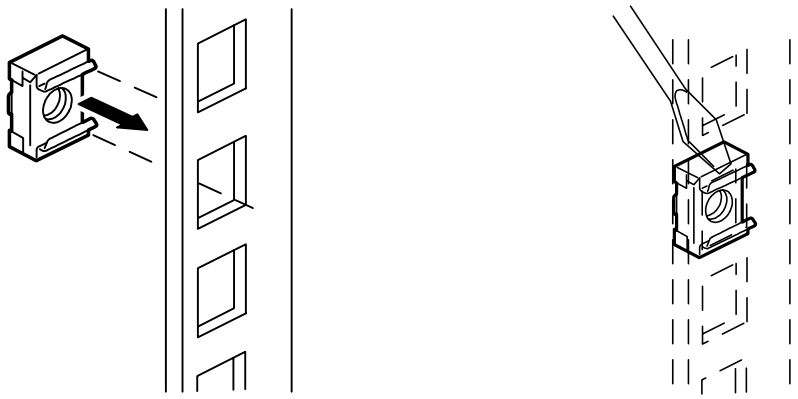
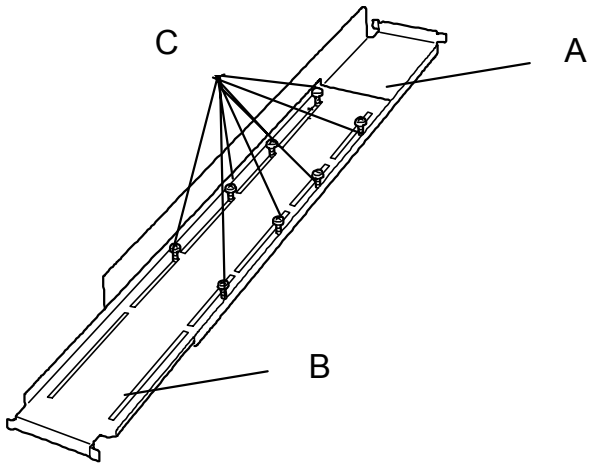


Figure 2-3. Inserting the Cage Nuts

5. Locate the two rail assemblies. Each rail assembly consists of an outer bracket and an inner bracket (see Figure 2-4). The rail assembly attaches to the rack cabinet.



A – Outer bracket
B – Inner bracket
C – Screws (8)

Figure 2-4. Rail Assembly

6. Loosen the eight screws that secure their outer and inner brackets together so that they can slide fairly easy (see Figure 2-4).

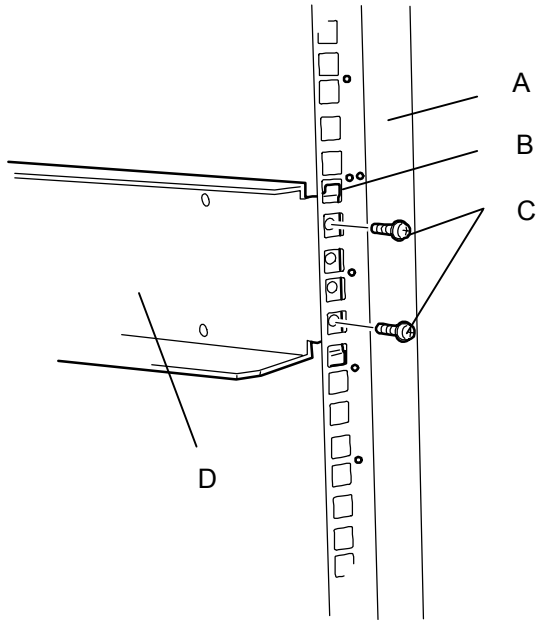
7. Align the right rail assembly behind the mounting holes in the vertical mounting rail (see Figure 2-5) located on the right side of the rack cabinet. The tabs on the front and rear of the rail assembly help to align it with the holes in the vertical-mounting rail.

> ***Note:*** For correct mounting orientation of the rail assemblies, the bottoms of the assemblies have a wider offset than the top.

8. Install two screws (see Figure 2-5) that secure the front of the rail assembly to the vertical-mounting rail and tighten loosely.
9. Carefully align the rear holes of the rail assembly with the holes in the rear vertical-mounting rail.
10. Install two screws that secure the rear of the rack assembly to the vertical-mounting rail.
11. Tighten all four screws holding the rail assembly to the vertical mounting rails.

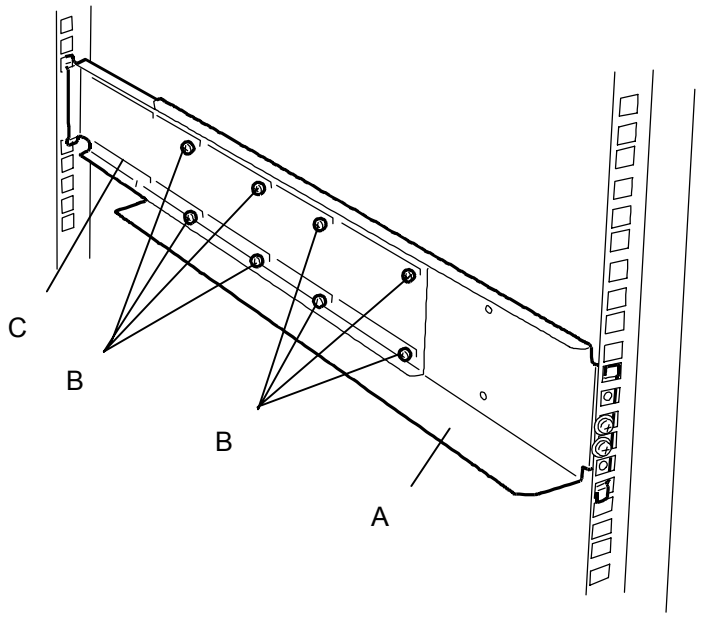
> ***Note:*** The screws in the oblong slots of the outer and inner brackets may need to be readjusted.

12. Tighten the eight screws securing the two brackets together (see Figure 2-6).
13. Repeat steps 5 through 10 for the left side rail assembly.



A – Vertical mounting rail
B – Alignment tab
C – Screws (2)
D – Right rail assembly

Figure 2-5. Installing the Right Rail Assembly into the Rack Cabinet



A – Outer bracket
B – Screws (8)
C – Inner bracket

Figure 2-6. Securing the Rail Assembly Outer and Inner Brackets

Mounting the Server Unit in the Rack Cabinet

Use the following procedure to mount the server unit into the rack cabinet.

⚠ WARNING

Anchor the Rack Cabinet. The rack cabinet must be anchored to an unmovable support or a front stabilizer to prevent it from falling over when one or more units are extended in front of it on slide assemblies. The anchors must be able to withstand a force of up to 113 kg (250 lbs.). You must also consider the weight of any other device installed in the rack.

Avoid Injury. It is required that at least two people are present when lifting and assembling the rack-mount server unit into a rack cabinet.

Do not attempt to lift or move the server unit by its front faceplate or the latches on its power supplies.

1. Use a mechanical assist unit or someone to assist you to carefully lift the server unit onto the two rail assemblies and slide it toward the rear of the rack cabinet. See Figure 2-7.

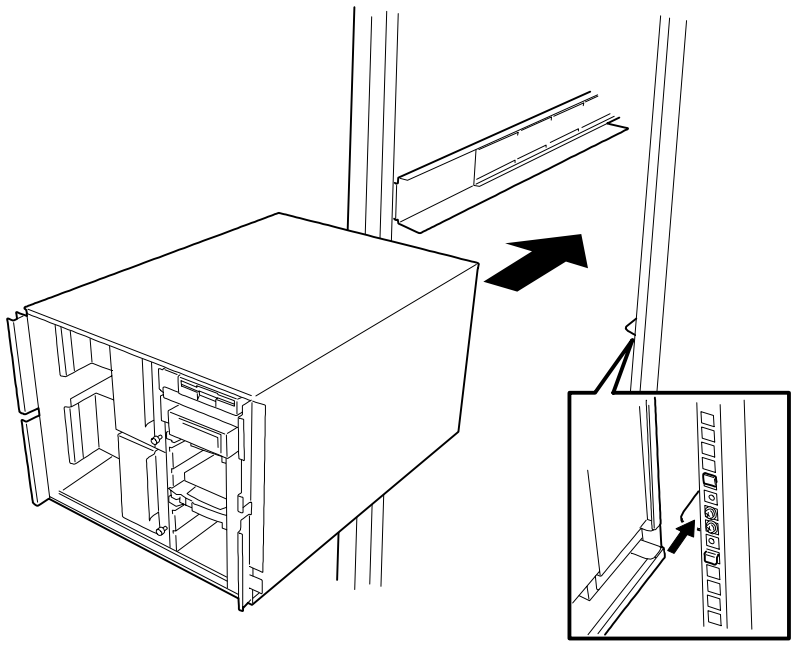
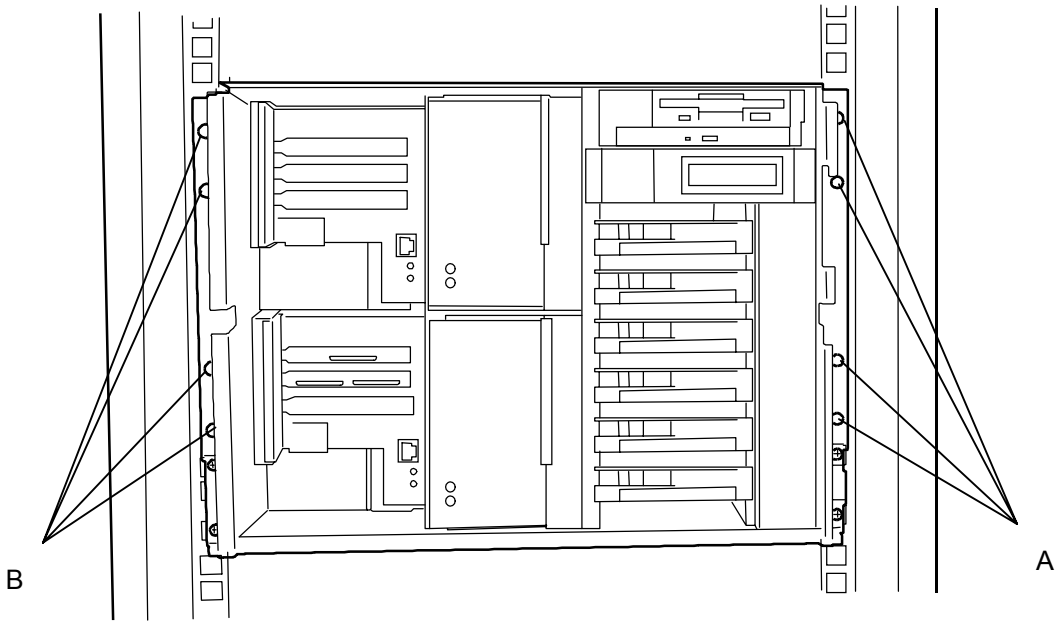


Figure 2-7 Mounting the Server Unit

2. Secure the front bezel to the rack cabinet's front vertical mounting rails using the eight screws and plastic washers provided.



A – Right-hand side mounting screws and washers (4)
B – Left-hand side mounting screws and washers (4)

Figure 2-8 Securing the Server Unit

Getting Familiar with the System

Before setting up your system, see *System Overview* in Chapter 1 of this User's Guide to become familiar with the system's characteristics, such as the location of your system's front and rear panel switches, indicators and connectors, etc.

Making Connections

If your system normally operates without a video display or keyboard (for example, as a network server), you must install a video display and keyboard to configure the system. You may remove them after running the BIOS Setup Utility. For information on running the BIOS Setup Utility, refer to Chapter 3 *Configuring Your System* of this User's Guide.

Connect your keyboard, monitor, and mouse; *see Figure 1-5* in Chapter 1 of this User's Guide. Connect any external peripheral devices such as a modem by following the instructions included with these devices.

⚠ CAUTION

Inserting a telephone line connector into a LAN board RJ-45 port may result in personal injury and equipment damage.

Connecting the Power Cord(s)

Plug the female end of each AC power cord into the input receptacle(s) on the rear of the server unit chassis (see Figure 2-9). Plug the male end of the power cord into NEMA 5-15R outlet for 100-120 VAC or NEMA 6-15R outlet for 200-240 VAC or optional UPS AC outlets. Most optional Uninterruptible Power Source (UPS) units have a 30 amp plug that requires a special L5-30R outlet (see Figure 2-10) to be plugged into a 100-120 VAC outlet.

If the power cord(s) supplied with the system are not compatible with the AC wall outlet in your region, obtain a suitable power cord that meets the following criteria.

- The power cord must be rated for the available AC voltage and have a current rating that is at least 125% of the current rating of the system.
- The power cord connector that plugs into the wall outlet must be terminated in a grounding-type male plug designed for use in your region. It must have certification marks showing certification by an agency acceptable in your region.
- The power cord connector that plugs into the system must be an IEC-type CEE-22 female connector.
- The power cord must be less than 1.8 meters (6.0 feet) long.

After the power cords are plugged in confirm that the power status lamp on the power units flashes. If the lamp is off, a failure occurred in the power unit, see *Table 1-1 System Status LED Indicators* in Chapter 1 of this User's Guide.

When connecting the power cord to a power control unit, such as an UPS confirm that the power control unit is powered off. Connecting the power cord while power is supplied to the power control unit may cause a failure.

⚠ WARNING

Your system shipped with a power cord for each power supply. Do not attempt to modify or use the supplied AC power cord if it is not the exact type required.

⚠ CAUTION

The power plug from each of the power supplies must be plugged into the same common ground power outlets.

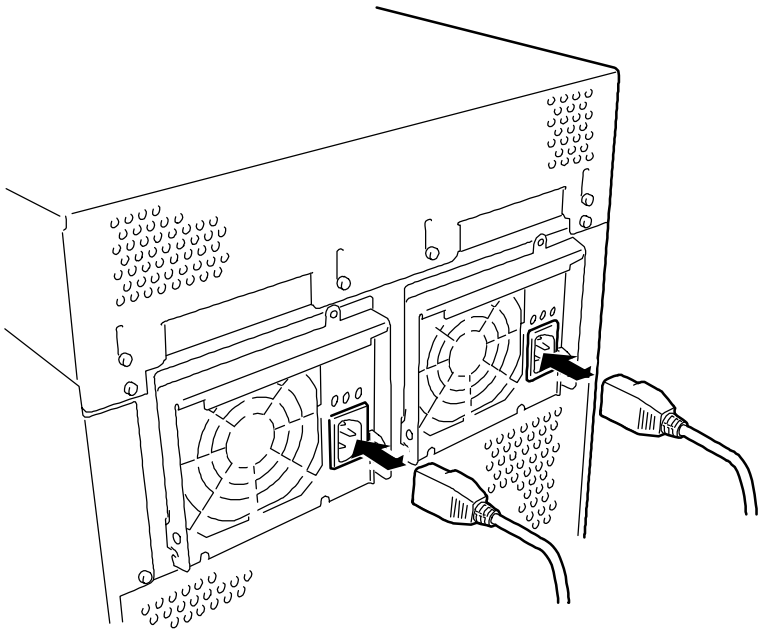


Figure 2-9. Connecting the AC Power Cord to the Server Unit

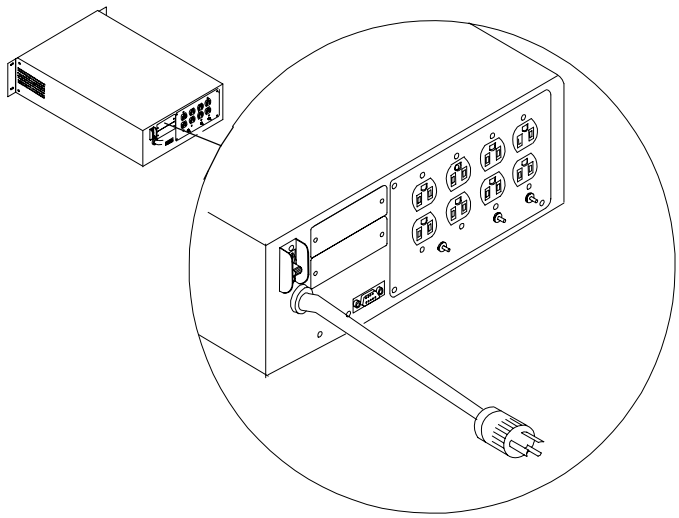


Figure 2-10. UPS AC Power Cord with 30 amp plug (L5-30P)

Using the System

The following subsections describe how to use this server system properly and safely, including an explanation of the server system power on/off sequences, what the POST program checks in the server, how to perform a forced power shutdown, and how to reset the system.

When using the server system the following precautions should be observed.

- Make sure you power off the server before connecting or disconnecting cables between the server and peripheral devices. Connecting or disconnecting the cables while the server is powered on may cause malfunction or failures within the server.
- Verify that the access lamp on the floppy disk drive is unlit before turning off the server or ejecting the floppy disk. Turning off the server or ejecting the floppy disk while the access lamp is lit may damage data being stored on the floppy disk.
- After turning off the server, wait at least 40 seconds before turning it on again. Cycling the power immediately may cause malfunction or failures of the server.
- Before relocating the server unit, turn off the power and unplug the power cords from the outlet. Moving the server unit when it is powered may cause malfunction or failures of the server.
- Some software includes a command to eject the CD-ROM tray. Make sure that the front door (tower-based system) or front panel (rack-mount system) of the server unit and the front door of the rack cabinet are opened before running the command. Running this command with any door or panel closed may cause the CD-ROM tray to hit against it, resulting in a possible failure of the CD-ROM or power supply.
- Clean the server regularly. Regular cleaning prevents failures of the server and its components.
- Lightning may cause a momentary voltage drop. To prevent this problem, an optional uninterruptible power supply unit is recommended.
- Only use options qualified by NEC for the server. An unqualified option may be mounted or connected to the server, but it may fail to operate normally or even cause failures. Note that damage resulting from installation of unapproved devices is not covered under warranty.

System Power

Low-level power is always present in the server system when the server unit is plugged into an AC source. This low-level standby power allows the BMC controller to monitor the status of the system components even when the system power is off.

The system power button functions as follows:

If:	Then pressing the power button:
System power = **off** Standby power = **on**	Powers on the system and boots the OS.
System power = **on**	Powers off the system, but standby power remains on.

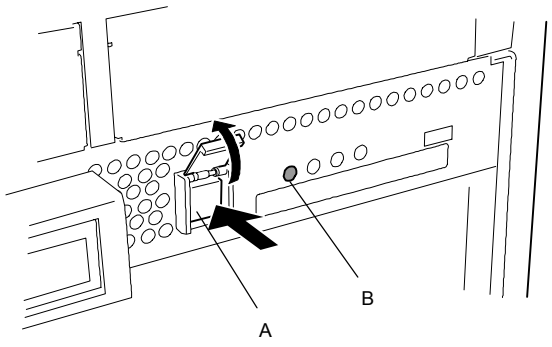
Powering On the Server System

Power on your server system as follows.

1. Make sure all external devices, such as a video display, keyboard, and mouse have been connected, and the power cords are connected.
2. Power on the video display and any other external devices.

> ***Note:*** If the server unit's power cords are connected to a power control unit such as an UPS (Uninterruptive Power Supply) make sure that the power control unit is powered on.

3. Lift the plastic cover protecting the system's power on/off switch and press the push-button (see Figure 2-11) to power on the system and boot the operating system. Verify that the server power-on LED is lit.



A Power on/off switch

B Power-on LED

Figure 2-11. Power On/OFF Switch and Power-On Indicator

After a few seconds your system begins the internal Power-On Self Tests (POST). POST automatically checks the system CPU modules, system PCI modules, ECC memory modules, keyboard, mouse, and most installed peripheral devices. POST also displays the start messages of the BIOS setup utility during execution.

The POST check results should be checked in the following cases:

- When the server is being used for the first time.
- When the server appears to fail.
- When the server beeps many times between power-on and OS start-up.
- When an error message appears on the display unit.

> ***Note:*** For error messages that appear on the display unit, refer to subsection *POST Error Codes and Messages* in Chapter 5 of this Guide.

> **⚠ CAUTION**
> Always allow POST to complete before powering down your system.

If you have problems powering on your system, refer to *Problem Solving* in Chapter 5 of this User's Guide.

After you have successfully powered on your system, refer to the preloaded system *Software Notes* document shipped with your system

Powering Off the Server System

When server system power is on, pressing the push-button power on/off switch on the front panel of the server turns the power off.

To turn the server system's power off:

1. Shutdown the operating system (OS).

   > ***Note:*** Avoid turning off system power before the OS has shut down completely.

2. If running W2KAS, the system should automatically power off. If not, then press the power button (see Figure 2-11).

   The power-on LED goes out.

   > ***Note:*** Check to see that no error messages are displayed on the LCD panel during power-off.

   The system power is off, but standby power remains on.

3. Power off the peripheral devices.

> ***Note:*** If the server power cord is connected to a power control unit such as an UPS (Uninterruptible Power Supply), refer to the UPS user's guide for proper power-off procedures.

Forcing a Power Shutdown

A forced power shutdown can be used when the system's power on/off switch does not power off the server or the reset functions do not work.

To perform a forced power shutdown:

Press in on the push-button power on/off switch located on the front panel of the server for at least 4 seconds to force the server power off.

To power on after a forced shutdown, wait 10 seconds and then power on again.

Resetting the System

To do this:	Press:
Soft boot reset, which clears system memory and reloads the operating system.	<Ctrl+Alt+Del>
Cold boot reset, which clears system memory, restarts POST, reloads the operating system, and halts power to all peripherals.	Power off/on

3

Configuring Your System

- Configuring Your System
- BIOS Setup Utility
- Fast!Util Utility
- Configuring System Jumpers

Configuring Your System

Configuration and setup utilities are used to change your system configuration. You can configure your system, as well as option boards you may add to your system, using the BIOS Setup Utility. Several unique system parameters are configured using the BIOS Setup, which is stored in the system FLASH memory.

The Fast!Util Utility is used if you need to configure either of the SCSI controllers in your system or to perform a SCSI disk format or verify disk operation of these drives.

If your system has been factory configured, the BIOS Setup or Fast!Util Utility do not need to be run unless you want to change the password or security features, add certain types of option boards or devices, or upgrade your system board.

This chapter also provides information on several system configuration parameters that are set by jumpers on the system board. However, these parameters do not usually require change.

Use the EXPRESSBUILDER CD-ROM to create the device driver diskettes.

BIOS Setup Utility

The BIOS Setup Utility is used to change system configuration parameters. The utility is resident in the system FLASH memory and does not require a diskette or an operating system present to run.

Using the BIOS Setup Utility

You access the BIOS Setup utility when you turn on or reboot your system. To run the BIOS Setup Utility, perform the following procedure:

1. Power-on or reboot the system.
2. If the NEC logo appears, press **ESC** in order to display POST information.
3. "Press <F2> to enter SETUP" displays.
4. Press **F2**. After a short period of time the BIOS Setup Utility starts and the Main Menu is displayed. The menu bar at the top of the Main Menu lists the following selections:

Menu	Use
Main	Use this menu for basic system configuration.
Advanced	Use this menu for setting the Advanced Features available on your system.
Security	Use this menu to set User and Supervisor Passwords and the Backup and Virus-Check reminders.
System Hardware	Use this menu for configuring unique Server features.
Boot	Use this menu to configure Boot Device priority.
Exit	Exits the current menu.

Use the arrow keys to select a menu or an item on a displayed menu. Press the value keys (see Table 3-1) to cycle through the allowable values for the selected field. Use the Exit menu's "Save Values" selection to save the current values on all the menus.

To display a submenu, position the cursor on a selection that has a submenu and press **ENTER**. An arrow precedes selections with submenus.

Refer to Table 3-1 for information on the value keys that you use with BIOS Setup. These keys are also listed at the bottom of the Setup menu.

Table 3-1 Setup Menu Value Keys

Key	Function in Setup Menu
F1 or Alt-H	Get Help about an item.
ESC	Exit the current menu and return to the previous menu.
Left or right arrow keys	Move between menus.
Up or down arrow keys	Move cursor up and down. The cursor moves only to the settings that you can change.
HOME or END	Move cursor to top or bottom of window.
PAGE UP or PAGE DOWN	Move cursor to next or previous page.
F5 or -	Select the previous value for the field.
F6 or + or SPACE	Select the next value for the field.
F9	Load default configuration values for this menu.
F10	Save configuration values and exit.
ENTER	Execute command or Select ➨ submenu.

BIOS Setup Configuration Settings

The BIOS Setup Configurations tables show the default settings for the BIOS Setup Utility and provides a place for you to record any changes you make to these settings. Recommended values are bold in the following tables.

Main Menu

Feature	Choices or Display Only	Description	Your Setting
Processor Type	————————	(Display Only). Shows the type of processor installed.	
Processor Speed	XXX MHz	(Display Only). Indicates the processor speed.	
Cache RAM	XXX KB	(Display Only). Indicates the cache RAM size.	
System Memory	XXX KB	(Display Only). Indicates the total capacity of the basic memory.	
Extended Memory	XXX MB	(Display Only). Indicates the total capacity of the extended memory.	
BIOS Version	————————	(Display Only). Indicates the version of the system BIOS.	
System Time	HH:MM:SS	Sets the system time (hour, minutes, seconds, on 24 hour clock).	
System Date	MM/DD/YYYY	Sets the system date (month, day, year).	
Language	**English (US)** German, French Italian, Spanish	Selects which language BIOS displays. Note: This feature *immediately* changes to the language BIOS selected.	
Primary Master	MATSHITA CR-176-(PM)	(Display Only). Shows the type of CD-ROM connected to IDE (Primary master).	
Primary Slave	LS-120 VER5 00-(PS)	(Display Only). Shows the type of superdisk connected to IDE (Primary slave).	

Advanced Menu

Feature	Description	Your Setting
Advanced	Refer to Advanced Submenu.	
Processor Information	Refer to Processor Information Submenu	
Memory Information	Refer to Memory Information Submenu.	
Peripheral Configuration	Refer to Peripheral Configuration Submenu.	
Monitoring Configuration	Refer to Monitoring Configuration Submenu. It sets POST Monitoring and Boot Monitoring.	
PCI Device	Refer to PCI Device Submenu.	
Option ROM	Refer to Option ROM Submenu. It Disables/Enables the mapping of Option ROM BIOS from the PCI Bus.	
Keyboard Features	Refer to Keyboard Features Submenu. It selects Keyboard Options.	

Advanced Submenu

Feature	Choices or Display Only	Description	Your Setting
Reset Configuration Data	**No** Yes	Select Yes if you want to clear the Extended System Configuration Data (ESCD) area. This parameter returns to No after the system is started.	
Boot-time Diagnostic Screen:	Disabled **Enabled**	Displays the diagnostic screen during POST instead of the Logo. The Boot-Time diagnostic screen is automatically enabled if redirection or ROMpilot is enabled.	
RomPilot Support	Disabled **Enabled**	Disables or enables RomPilot support (including the remote console and remote drive functions during activation of OS). The Boot-time diagnostic screen is enabled if RomPilot is enabled. (See Appendix B for more details.)	
POST Error Pause:	Disabled **Enabled**	Pauses and displays SETUP entry or resume boot prompt if error occurs on boot, If disabled, system always attempts to boot.	

Processor Information Submenu

Feature	Choices or Display Only	Description	Your Setting
Processor 1 Type:	0686	(Display Only). Shows the type of processor installed on Processor 1.	
Processor 2 Type:	none	(Display Only). Shows the type of processor installed on Processor 2.	

Memory Information Submenu

Feature	Choices or Display Only	Description	Your Setting
DIMM #0 Size:	128 MB	(Display Only). Shows the memory size of DIMM installed.	
DIMM #0 Speed:	133 Mhz	(Display Only). Shows the clock speed of DIMM installed.	
DIMM #1 Size:	None*	(Display Only). Shows the memory size of DIMM installed.	
DIMM #1 Speed:	None	(Display Only). Shows the clock speed of DIMM installed	
DIMM #2 Size:	None	(Display Only). Shows the memory size of DIMM installed.	
DIMM #2 Speed:	None	(Display Only). Shows the clock speed of DIMM installed	
DIMM #3 Size:	None	(Display Only). Shows the memory size of DIMM installed.	
DIMM #3 Speed:	None	(Display Only). Shows the clock speed of DIMM installed	

*None = No DIMM installed.

Peripheral Configuration Submenu

Feature	Choices or Display Only	Description	Your Setting
Serial Port 1: (COM 1)	Disabled 3F8, IRQ3 **3F8, IRQ4** 2F8, IRQ3 2F8, IRQ4 3E8, IRQ3 3E8, IRQ4 2E8, IRQ3 2E8, IRQ4 Auto	Disables serial port 1 or selects the base address and interrupt (IRQ) for serial port 1.	
Serial Port 2: (COM 2)	Disabled 3F8, IRQ3 3F8, IRQ4 **2F8, IRQ3** 2F8, IRQ4 3E8, IRQ3 3E8, IRQ4 2E8, IRQ3 2E8, IRQ4 Auto	Disables serial port 2 or selects the base address and interrupt (IRQ) for serial port 2. If Console Redirection is enabled, this port configuration must match the settings for the console port.	

Monitoring Configuration Submenu

Feature	Choices or Display Only	Description	Your Setting
Option ROM Scan Monitoring	**Disabled** Enabled	Disables and enables the Option ROM Scan Monitoring Feature.	
Option ROM Monitoring Time-out*	**5** (1 to 20)		
Boot Monitoring	**Disabled** Enabled	Disable or enable the boot monitoring feature. Set to disabled when installing OS. Once OS is installed, re-enable.	
Boot Monitoring Time-out Period*	**5** (1 to 20)		
POST PAUSE Monitoring	Disabled **Enabled**	Disables and enables the POST Pause Monitoring Feature.	
POST Pause Monitoring Time-Out*	**3** (1 to 20)	Selects the time-out value of the POST Pause Monitoring Feature.	

*This feature is displayed only when POST Pause Monitoring is Enabled.

PCI Device Submenu

Feature	Choices or Display Only	Description	Your Setting
PCI Slot: 1 — PCI Slot: 4 On Board SCSI:	Disabled **Auto Select** IRQ3 IRQ4 IRQ7 IRQ9 IRQ10 IRQ15	PCI devices use hardware interrupts called IRQs. A PCI device cannot use IRQs already in use by ISA devices, use "Auto" only if no ISA legacy cards are installed.	
On Board LAN:	IRQ5	(Display Only). Shows interrupt assigned to on-board LAN.	

Option ROM Submenu

Feature	Choices or Display Only	Description	Your Setting
Onboard SCSI	**Enabled** Disabled	Disables/Enables the mapping of the onboard SCSI BIOS.	
Onboard LAN	**Enabled** Disabled	Disables/Enables the mapping of the onboard LAN BIOS	
PCI Slot 1	**Enabled** Disabled	Initializes device expansion ROM.	
PCI Slot 2	**Enabled** Disabled	Initializes device expansion ROM.	
PCI Slot 3	**Enabled** Disabled	Initializes device expansion ROM.	
PCI Slot 4	**Enabled** Disabled	Initializes device expansion ROM.	

Keyboard Features Submenu

Feature	Choices or Display Only	Description	Your Setting
Numlock	**Auto** On OFF	Selects the power-on state for Numlock.	
Key Click	**Disabled** Enabled	Disables or enables keyclick.	
Keyboard Auto-repeat Rate	**10/sec** 6/sec 2/sec	Selects key repeat rate.	
Keyboard Auto-repeat Delay	0.25 sec 0.5 sec 0.75 sec **1 sec**	Selects delay before key repeat.	

Security Menu

Note: Enabling the Supervisor Password field requires a password for entering Setup. The passwords are not case sensitive.

Feature	Choices or Display Only	Description	Your Setting
Supervisor Password is	**Clear**	Status only, user cannot modify. Once set, this can be disabled by setting it to a null string, or by clearing password jumper on system board (see System Board Jumpers in this Chapter).	
User Password is	**Clear**	Status only, user cannot modify. Once set, this can be disabled by setting it to a null string, or by clearing password jumper on system board (see System Board Jumpers in this Chapter).	
Set Supervisor Password	Press **ENTER**	Supervisor password (up to 7 alphanumeric characters) controls access to the setup utility. When the <Enter> key is pressed, the user is prompted for a password; press ESC key to abort. Once set, this can be disabled by setting it to a null string, or by clearing password jumper on system board (refer to System Board Jumpers in this chapter). This feature is available only when you logged in the SETUP utility with the supervisor password.	
Set User Password	Press **ENTER**	When the <Enter> key is pressed, the user is prompted for a password (up to 7 alphanumeric characters); press ESC key to abort. Once set, this can be disabled by setting it to a null string, or by clearing password jumper on system board (refer to System Board Jumpers in this chapter). With a user password, accessible SETUP menus are restricted. This feature is available only if the Supervisor Password is specified.	
Password on Boot	**Disabled** Enabled	Disables or enables password entry on boot.	

Feature	Choices or Display Only	Description	Your Setting
Power Switch Mask	Masked **Unmasked**	Determines whether power switch is masked or unmasked. Selecting "Masked" disables power-off with the power switch after the operating system is started (including shutdown by pressing the Power switch for at least 4 seconds.)	
Option ROM Menu Mask	**Unmasked** Masked	Determines whether Option ROM Menu Mask is masked or unmasked.	
Processor Serial Number	**Disabled** Enabled	Determines whether Processor Serial Number feature is enabled or disabled.	

System Hardware Menu

Feature	Choices or Display Only	Description	Your Setting
Thermal Sensor		Refer to Thermal Sensor Submenu.	
Wake On Events		Refer to Wake On Events Submenu.	
AC Link	Power On **Last State** Stay Off	Determines the mode of AC Link. This determines the state of the server when AC power is reapplied (see Table below). Note: When "Wake On LAN" is enabled, *Stay Off* is the only choice for selection.	
Error Log Initialization	Press **Enter**	Request to initialize the System Error Log now. If *Clear OK*, then display "System Event Log Cleared!" If *Clear NG*, then display "System Event Log Not Cleared!"	
Console Redirection		Additional setup menus to configure console. The Boot-time diagnostic screen is enabled if redirection is enabled.	

Server Power State Versus AC Link Settings

State Before Power Off	Setting		
	Stay Off	**Last State**	**Power On**
In Service	Off	On	On
Out of Service (DC Power Off)	Off	Off	On
Forced Shutdown*	Off	Off	On

*Pressing the Power switch for at least 4 seconds shuts down power to the server.

Thermal Sensor Submenu

Feature	Choices or Display Only	Description	Your Setting
Thermal Sensor	Disabled **Enabled**	When enabled determines if the BIOS will disable boot (if temperature is not within a safe range).	
Upper Limit	**50** (11 to 80)	Sets the upper temperature limit in Centigrade.	
Lower Limit	**5** (0 to 69)	Sets the lower temperature limit in Centigrade.	

Wake On Events Submenu

Feature	Choices or Display Only	Description	Your Setting
Wake On LAN	Disabled **Enabled**	Enables Wake ON LAN support.	

Console Redirection Submenu

Feature	Choices or Display Only	Description	Your Setting
Serial Port Address	**Disabled** Serial Port 2 (3F8h/IRQ4) Serial Port 2 (2F8h/IRQ3)	If enabled, the console will be redirected to this port. If console redirection is enabled, this address must match the settings of serial port 2.	
Baud Rate	57.6K **19.2K**	Enables the specified baud rate.	
Flow Control	No Flow Control **XON/OFF**	Enables flow control.	
Console Connection	**Direct** Via Modem	Indicate whether the console is connected directly to the system or a modem is used to connect.	

Boot Menu

Use the up or down arrow keys to select a device, then press the <+> or <-> keys to move the device higher or lower in the boot priority list.

Boot Device Priority Menu

Boot Priority	Device	Description	Your Setting
1.	ATAPI CD-ROM Drive	Attempts to boot from an ATAPI CD-ROM drive.	
2.	Removable Devices	Attempts to boot from a diskette drive.	
3.	Hard Drive	Attempts to boot from a hard drive device.	
4.	Intel UNDI, PXE-2.0 (Build 071)	Attempts to boot from a PXR server.	

Exit Menu

You can make the following selections on the Exit Menu. Select an option using the up or down arrow keys, then press <Enter> to execute the option. Pressing <Esc> does not exit this menu. You must select one of the items from the menu or menu bar to exit.

Exit Menu

Choices	Description
Save Changes and Exit	Exits System Setup after saving all changes to CMOS.
Exit Without Saving Changes	Exits System Setup without saving setup data to CMOS.
Get Default Value	Loads default values for all Setup items.
Load Previous Values	Loads previous values from CMOS for all Setup items.
Save Changes	Writes all Setup item values to CMOS.

Fast!Util Utility

The Fast!Util utility detects the SCSI host adapters on the PCI board and on option SCSI controller boards. However, the Fast!Util is only used when an optional SCSI Controller is installed and is used mainly to set the transfer rate of connected SCSI device.

Use the Fast!Util to:

- Change default values
- Check and/or change SCSI device settings that may conflict with those of other devices in the server

Running the Fast!Util

You access the Fast!Util when you turn on or reboot your system.

To run the Fast!Util utility, perform the following procedure:

1. Power-on or reboot the system.
2. The following message appears on the video monitor:

   Press Alt-Q for Fast!Util...

3. Press Alt+Q to run this utility. The Fast!Util starts and the Fast!Util Options Menu is displayed listing the following selections.

Fast!Util Options Menu
Configuration Settings
Scan SCSI Bus
SCSI Disk Utility
Select Host Adapter
Exit Fast!Util

4. Highlight *Select Host Adapter* using the cursor keys and press **ENTER**.
5. The *Select Host Adapter* screen is displayed. Select the proper adapter.

   Note: **Do Not** select *Adapter QLA12160 Ultra3 5800* it is the on-board SCSI host adapter.

6. Highlight one of the displayed *Adapter Types* with the cursor keys and press **ENTER.**
7. The display returns to the *Fast!Util Options* menu where you can continue to change the system SCSI configuration parameters. The name of the selected host adapter is displayed in the upper left-hand corner of the screen.

Configuration Settings Menu

The *Configuration Settings Menu* lists the following selections.

Configuration Settings Menu
Host Adapter Settings
SCSI Device Settings
SCSI Bus Settings
Autoconfigure SCSI Devices
Selectable Boot Settings
Restore Default Adapter Settings
Raw Nvram Data

Host Adapter Settings Submenu

Feature	Choices or Display Only	Description	Your Setting
BIOS Address	—	(Display Only).	
BIOS Revision	—	(Display Only).	
Interrupt Level	—	(Display Only).	
Host Adapter BIOS	**Enabled** Disabled	Specify whether the BIOS extension of the host adapter is enabled or disabled.	
PCI Bus DMA Burst	**Enabled** Disabled	Specify whether the DMA burst transfer on the PCI bus is enabled or disabled.	
CDROM Boot	Enabled **Disabled**	Specify whether the start from CD-ROM is enabled or disabled.	
Adapter Configuration	**Auto** Manual Safe	Specify whether the adapter configuration is set automatically by BIOS, manually, or safely.	
Drivers Load RISC	**Enabled** Disabled	Specify whether the load of RISC codes is enabled or disabled.	
>4Gbyte Addressing	**Enabled** Disabled	Specify whether hard disks of 4 GB or larger are used or not used.	
Fast Command Porting	**Enabled** Disabled	Factory set. Do not change.	

SCSI Device Settings Submenu

Feature	Choices or Display Only	Description	Your Setting
Disconnects OK	**Yes** No	Specify whether the disconnection of SCSI devices from the SCSI bus is enabled or disabled.	
Check Parity	**Yes** No	Specify whether the parity check is provided or is not provided.	
Enable LUNs	**Yes** No	Specify whether more than one LUN number are given to SCSI ID.	
Enable PPR	Yes **No**	Factory set. Do not change.	
Enable Device	**Yes** No	Factory set. Do not change.	
Negotiate Wide	**Yes** No	Specify whether the wide (32 bits) transfer is enabled or disabled.	
Negotiate Synchronous	**Yes** No	Specify whether the synchronous transfer is enabled or disabled.	
Tagged Queuing	Yes No	Factory set. Do not change.	
Sync Offset	00, 02, 04, 06, 08, 10, 12, 14, 16, 18, 20, 22, **24**	Select the proper offset value in synchronous transfer.	
Sync Period	Transfer Rate (Mbytes/sec) 9 160 (Ultra3 SCSI) **10** 80 (LVD SCSI) 12 40 (Ultra SCSI) 25 20 (Fast SCSI) 40 12.5	Select the proper speed in synchronous transfer.	
Exec Throttle	1, 4, 8, **16**, 32, 64, 128, 255	Factory set. Do not change.	

SCSI Bus Settings Submenu

Feature	Choices or Display Only	Description	Your Setting
SCSI Bus SCSI ID	0, 1, 2, 3, 4, 5, 6, **7**, 8, 9, 10, 11, 12, 13, 14, 15	Specify the SCSI bus ID value. Value 7 is set for SCSI Bus 0 and value 6 is set for SCSI Bus 1.	
SCSI Bus Reset	**Enabled** Disabled	Make the reset valid or invalid for SCSI buses.	
SCSI Bus Reset Delay	0, 1, 2, 3, 4, **5**, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15	Factory set. Do not change.	
SCSI Bus Termination	**Auto** High only Disabled Enabled	Set the termination resistance of the SCSI bus.	

Autoconfigure SCSI Device Submenu

When "Autoconfigure SCSI Device" is selected the screen for setting the information on the device connected to the host adapter appears.

The parameters (choices) and their default settings are the same as those listed in the table for "SCSI Device Settings."

Notes: Always check the SCSI ID of the target device before changing the SCSI bus settings and SCSI IDs.

The default settings at shipment are identical for both SCSI bus 0 and SCSI bus 1.

The following items can be changed by setting the *Adapter Configuration* in "SCSI Device Setting" to *Manual*.

- Enable Device
- Enable LUNs
- Negotiate Wide
- Negotiate Sync
- Tagged Queuing
- Sync Offset
- Sync Period
- Exec Throttle

Selectable Boot Settings Submenu

Feature	Choices or Display Only	Description	Your Setting
Selectable SCSI Boot	Enabled **Disabled**	Specify whether the boot from the SCSI device can be selected or not selected.	
SCSI Bus	**0** 1	Select the bus to which the started SCSI device is connected.	
SCSI Boot ID	**0**, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15	Set the SCSI ID of the started SCSI device.	
SCSI Boot LUN	**0**, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15	Select the number of the LUN to which the started SCSI device is bound.	

Restore Default Settings Submenu

When "Restore Default Settings" is selected the screen for returning the setting values to the default values is displayed.

> ***Note:*** After restoring the default settings you must set the SCSI ID for SCSI Bus 1 to the value 6. Also, under the "Host Adapter Settings Submenu" the *>4Gbyte Addressing* must be set to "Enabled".

Raw NVRAM Data Submenu

When "Raw NVRAM Data" is selected the information on NVRAM installed in the host adapter is displayed in hexadecimal format and can not be edited. This function is only provided to solve problems.

Scan SCSI Bus

When "Scan SCSI Bus" is selected in the "Fast!Util Options Menu" the list of devices connected to each SCSI bus is displayed in the order of SCSI IDs. The information to be displayed includes the vendor (device manufacturer), product name, and firmware revision.

SCSI Disk Utility

When "Scan SCSI Bus" is selected in the "Fast!Util Options Menu" the utility menu appears that is used to format or verify the connected SCSI devices.

⚠ CAUTION

Devices can be processed in SCSI buses and SCSI IDs. Be careful not to forget the selected bus and ID.

The selection of "Continue With Format" in "Low-Level Format" causes all data in disks to be lost.

- Low-Level Format

  Physically formats the device selected in "Continue With Format." If you select "Do Not Format Disk", the prior menu displayed reappears.

- Verify Disk Media

  Verifies the device selected in "Continue With Verify." If you select "Do Not Verify Media," the prior menu displayed reappears.

- Select Different Disk

  Selects another SCSI device on the same SCSI bus.

Select Host Adapter

When "Select Host Adapter" is selected from the "Fast!Util Options" menu, the list of the host adapters installed in the main system is displayed. Select the adapter for which the settings are modified.

Note: **Do Not** select *Adapter QLA1280* Single Ended/LVD 5800 it is used for built-in hard disk.

The utility menu appears which is used to format or verify the connected SCSI devices.

Exit

After modifying the settings, press **ENTER** several times to display the "Fast!Util Options" menu. If you select "Exit Fast!UTIL"from the menu, the screen for terminating Fast!UTIL appears.

However, if the settings are different from those before the start, the screen prompting you to save the settings appears before the display of the termination screen.

The "Configuration Settings Modified" screen selections are as follows.

Configuration Settings Modified
Save Changes
Do not save changes

The termination screen "Exit Fast!UTIL" selections are as follows.

Exit Fast!UTIL
Reboot System
Return to FAST!UTIL

Configuring System Jumpers

Before You Begin

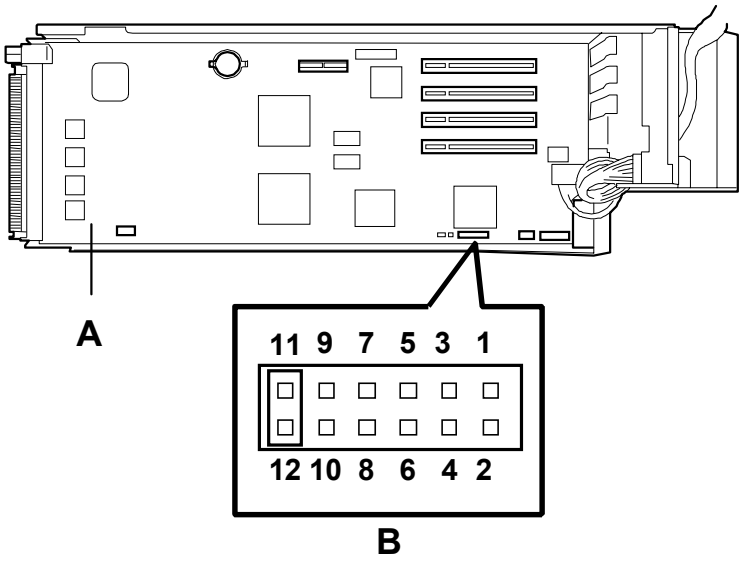
Only a qualified technical person should perform the procedures in this section.

⚠ CAUTION

Electrostatic discharge (ESD) can damage the system boards. Modify system boards only at an ESD workstation. Otherwise, wear an antistatic wrist strap attached to chassis ground.

The jumper blocks on the PCI board located in the PCI module (one PCI board per PCI module) enable you to set specific operating parameters for your system. A jumper is a small plastic-encased conductor (shorting plug) that slips over two jumper pins.

Figure 3-1 shows the location of the system jumpers.



A PCI board

B System jumpers

Figure 3-1. System Jumpers

Table 3-2 lists the System Jumpers and their factory default settings.

⚠ CAUTION

DO NOT change any other switch jumper settings. Any change may cause the server to fail or malfunction.

Table 3-2. System Jumper Summary

Jumpers	Function	Jumper On/Off (default in bold)	What it does at system reset.
1–2	CMOS clear*	**Off, Protect** On, Erase	Preserves the contents of CMOS. Clears CMOS.
3–4	Password disable	**Off, Enable** On, Disable	Enables password protection. Disables the password.
5–6	Reserved	**Off, Not Used**	Reserved. Do Not Change.
7–8	Reserved	**Off, Not Used**	Reserved. Do Not Change.
9–10	Reserved	**Off, Not Used**	Reserved. Do Not Change.
11–12	Spare	Off, Not Used **On, Spare**	Provides a spare jumper.

*Clearing CMOS returns the system to its factory default settings.

Moving System Jumpers

⚠ CAUTION

Before doing the procedures in this section, make sure that your system is powered off and unplug the AC power cords from the back of the chassis. Failure to disconnect power before moving the jumpers can result in personal injury and equipment damage.

Observe static precautions. Use an antistatic wrist strap.

To configure the system jumpers on the PCI board:

1. Perform steps 1 through 5 of subsection *Modifying the PCI Board* in chapter 4.

   Note: Use the same jumper settings for both PCI module s.

2. Locate the position of the system jumpers that you are changing on the PCI board. To change a jumper setting, use a pair of needle-nose pliers or your fingers to remove the jumper from its current location, see Figure 3-2. Position the jumper over the two pins for the desired setting and press it onto the pins. Be careful not to bend the pins. Refer to Table 3-2 for system jumper settings.

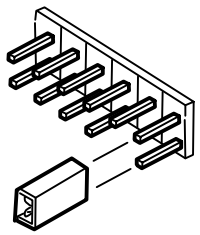


Figure 3-2 Moving a Jumper (Shorting Plug)

3. Perform steps 12 through 14 of subsection *Modifying the PCI Board* in chapter 4.

Clearing CMOS and Password

To clear CMOS and password:

1. Perform steps 1 through 5 of subsection *Modifying the PCI Board* in chapter 4.
2. Remove the spare jumper from pins 11 and 12 on system jumper block, see Figure 3-1.
3. If clearing CMOS, reinstall the spare jumper on pins 1 and 2 (CMOS clear) of system jumper block. Otherwise, go to next step.
4. If clearing password, reinstall the spare jumper on pins 3 and 4 (Password disable) of system jumper block. Otherwise, go to next step.
5. Perform steps 12 through 14 of subsection *Modifying the PCI Board* in chapter 4.
6. While waiting for POST to complete, press the F2 key to enter BIOS setup. This automatically clears CMOS and all passwords, provided you exit and save the BIOS setup.
7. Repeat step 1 of these procedures.
8. Remove the jumper you just installed on the system jumper block and place it back on pins 11 and 12 as the spare jumper.
9. Perform steps 12 through 14 of subsection *Modifying the PCI Board* in chapter 4.
10. If specifying a new password run the BIOS Setup Utility as described earlier in this chapter.

4

CRU Replacement and Upgrades

- General Information
- Precautions
- Preparing Your System for Upgrade
- Opening and Closing the Front Door of the Tower Cabinet
- Removing and Installing the Front Covers of the Rack-Mount System
- Replacing CPU Modules
- Replacing or Adding Processors and VRMs
- Replacing or Adding DIMMs
- Removing a PCI Module
- Installing PCI Adapter Boards
- Removing PCI Adapters Boards
- Installing a PCI Module
- Replacing or Adding Disk Drives
- Replacing the Device Module
- Replacing a Power Supply
- Installing the Internal Device Bay Expansion Kit
- Installing and Removing Optional 5.25-Inch Tape Drives

General Information

This chapter contains procedures for removing and installing customer-replaceable units (CRUs) and step-by-step instructions for upgrading your server system. When you disassemble any part of the server, note the orientation and placement of any cables or shielding that you remove.

⚠ WARNING

The DC push button on/off switch on the front panel does not turn off system AC power. Also, +5vdc is present on the system boards whenever the AC power cord is connected between the system and an AC outlet. Before performing any procedures that require the server to be off, first power off the DC by pushing the power on/off button located on the front panel. Make sure your system is powered off and the AC power cord is unplugged from the system. Failure to disconnect power before opening your system can result in personal injury and equipment damage.

⚠ CAUTION

Operating your system with the access cover removed can damage system components. For proper cooling and airflow, always replace the access cover before powering on.

Precautions

The following warnings and cautions apply throughout this chapter. Only a technically qualified person should integrate and configure the system.

The only procedures that can safely be done with the system power on is removing or installing (hot-swapping) an SCA disk drive/carrier assembly in the SCSI hot-swap drive cage, hot-swapping a failed power supply, hot-swapping a failed device module, or hot swapping a CPU or PCI module. Note that hot-swapping a PCI module or a CPU module requires that the other module be operating properly. For any other procedures inside the system, turn off system power and disconnect the AC power cord (s).

⚠ WARNING

Before doing any procedures in this chapter that require the server to be off, make sure that your system is powered off and unplug all AC power cords. Failure to disconnect power before opening your system can result in personal injury and equipment damage.

System power on/off. The DC push-button on/off switch (a convex button) on the front panel DOES NOT turn off the system AC power. To remove power from system, you must unplug the AC power cords (from wall outlets or power supply).

Hazardous conditions, power supply. Hazardous voltage, current, and energy levels are present inside the power supply. There are no user serviceable parts inside it; servicing should be done by technically qualified personnel.

Hazardous conditions, devices & cables. Hazardous electrical conditions may be present on power, telephone, and communication cables. Turn off the system and disconnect the power cords, telecommunications systems, networks, and modems attached to the system before opening it. Otherwise, personal injury or equipment damage can result.

⚠ CAUTION

Electrostatic discharge (ESD) and ESD protection. ESD can damage disk drives, boards, and other parts. This system can withstand normal levels of environmental ESD while you are hot-swapping SCSI hard drives or hot-swapping a failed fan module or power supply. However, we recommend that you do all procedures in this chapter only at an ESD workstation. If one is not available, provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground (any unpainted metal surface) on your system when handling parts.

ESD and handling boards. Always handle boards carefully. They can be extremely sensitive to ESD. Hold boards only by their edges. After removing a board from its protective wrapper or from the system, place it component-side up on a grounded, static-free surface. Use a conductive foam pad if available but not the board wrapper. Do not slide board over any surface.

Chassis covers, proper cooling and airflow. For proper cooling and airflow, always install the chassis top cover before turning on the system. Operating it without the cover in place can damage system parts.

Contact your sales representative or dealer for a list of approved optional peripheral devices.

Preparing Your System for Upgrade

Always observe the following guidelines when replacing or installing devices in your system.

- Your fault-tolerant server allows you to remove, install, and replace devices while the server is in continuous operation. However, when it is necessary to work on the server with its power off, you must use the Windows 2000 shut down procedures, power off the server, and disconnect all the power cords and interface cables.
- To remove a CPU module or PCI module while the system is in an operational state the module must be disabled (placed into off-line status) by using the server utility of the ESMPRO/ServerAgent or the ESMPRO/ServerManager from the management PC on the network. Then after a new module is installed it must be reenabled by using the server utility of the ESMPRO/ServerAgent or the ESMPRO/ServerManager.

> ***Note:*** The system default automatically boots a module, once installed.

- Do not remove a CRU when its amber status LED indicator is on. This indicates that the CRU is operating in simplex mode (i.e., its duplex partner is not functional) and removing it will cause the system to fail.
- Provide the same hardware configuration for both group 1 and group 2.
- Ensure that the installed devices have the same specifications, performance, and features.

Have the following tools available:

- Phillips screwdriver (#2 bit)
- flat-head screwdriver
- small needle nose pliers
- pen or pencil
- utility knife
- ESD workstation or antistatic wrist strap (recommended.)

Opening and Closing the Front Door of the Tower Cabinet

> **Note:** This procedure is for tower-based systems only.

You must open the front door to turn the server power on or off, mount or dismount a hard disk drive, and access the CD-ROM drive or floppy disk drive.

> **Note:** The CD-ROM drive has a function to eject the media using a software command. Before issuing a software command to eject the media, confirm that the front door is open. If the command is executed while the front door is closed the media may run into the front door resulting in an error or may cause the unit to fail.

To open the front door of the tower cabinet, perform the following.

1. Observe the safety and ESD precautions listed at the beginning of this chapter.
2. Unlock (if locked) the mechanical lock that is located approximately half way up on the left-hand side of the front door and swing the door open. The front door is unlocked by inserting the security key into the lock and turning it clockwise a quarter turn. See Figure 4-1.

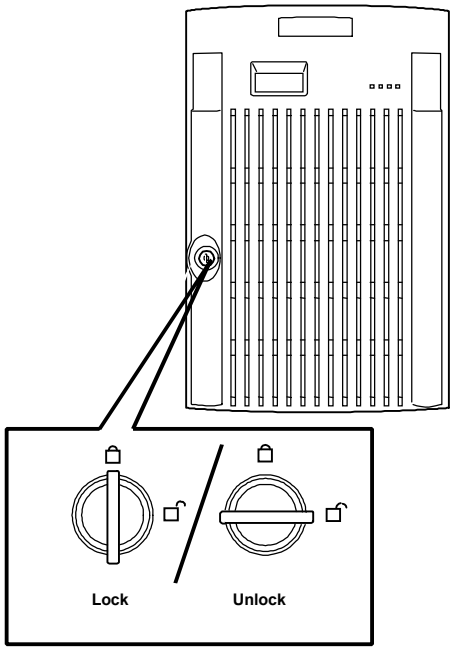


Figure 4-1. Unlocking and Locking the Front Door

To close the front door of the tower cabinet, perform the following.

1. Observe the safety and ESD precautions listed at the beginning of this chapter.
2. Carefully swing the front door closed and lock the door. The front door is locked by inserting the security key into the lock, which is located approximately half way up on the left-hand side of the front door, and turning the key counter clockwise a quarter turn. See Figure 4-1.

Removing and Installing the Front Covers of the Rack-Mount System

> **Note:** This procedure is for rack-mount systems only.

The rack-mount system consists of two front covers. The upper cover is removed for turning the server power on and off and when accessing the CD-ROM drive or floppy disk drive. Both the upper cover and lower cover are removed when accessing the CPU modules, the PCI modules, and the SCSI disk drive bays.

> **Note:** The CD-ROM drive has a function to eject the media using a software command. Before issuing a software command to eject the media, confirm that the upper front cover is open. If the command is executed while the upper front cover is closed the media may run into the front cover resulting in an error or may cause the unit to fail.

To remove the front covers from the rack-mount system, perform the following.

1. Observe the safety and ESD precautions listed at the beginning of this chapter.
2. Unlock (if locked) the mechanical lock that is located approximately half way up on the right-hand side of the front cover. The front cover is unlocked by inserting the key into the lock and turning it counter clockwise a quarter turn. See Figure 4-2.

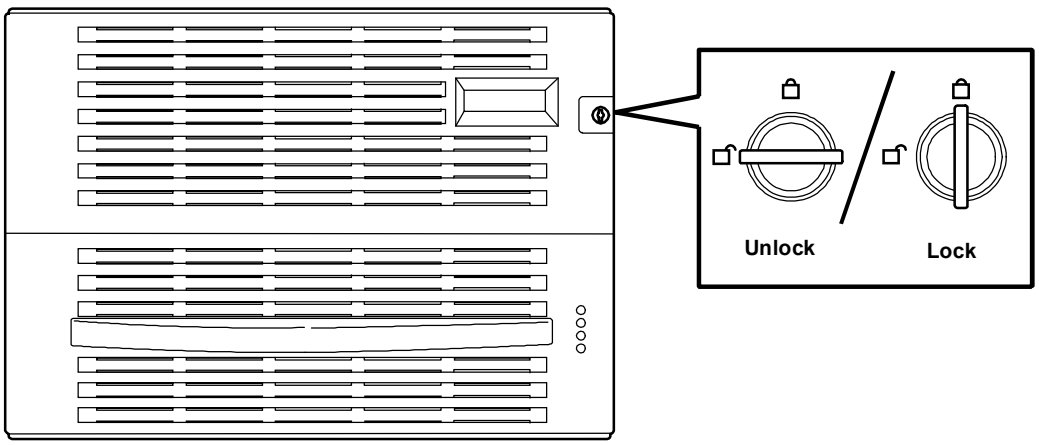


Figure 4-2. Unlocking the Front Cover

3. While holding the right-hand side of the upper front cover pull it toward you and slide it a little to the left to remove its holding tab from the frame of the chassis and then the remove the cover. See Figure 4-3.

4. Remove the lower front cover by repeating step 3 above.

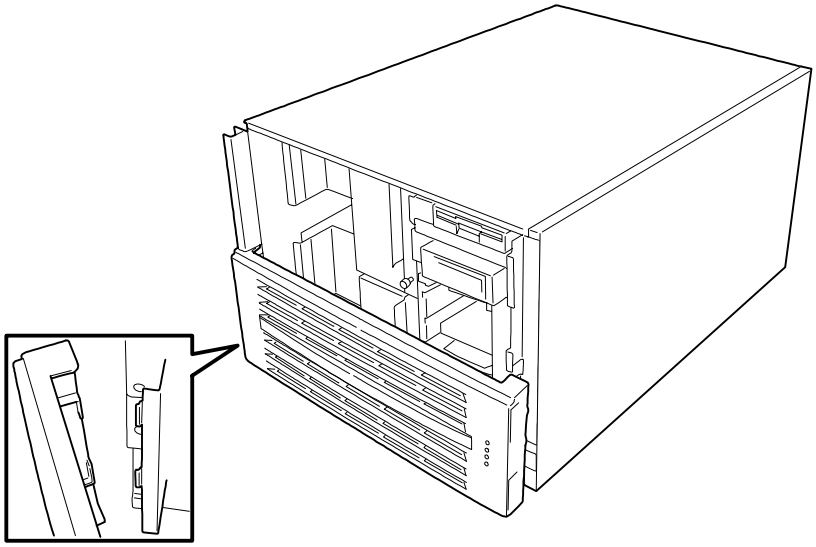


Figure 4-3. Removing the Front Covers

To install the front covers of the rack-mount system, perform the following.

1. Observe the safety and ESD precautions listed at the beginning of this chapter.
2. Install the lower front cover first and then the upper one. See Figure 4-4. To install the lower and upper front covers fasten the tab on the left hand-side of each of the front covers to the server.
3. Lock the upper front cover by inserting the security key into the lock, which is located approximately half way up on the right-hand side of the front door, and turning the key clockwise a quarter turn. See Figure 4-1.

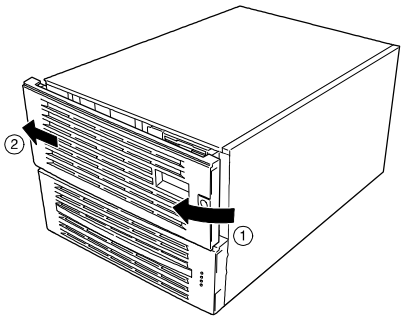


Figure 4-4. Installing the Front Covers

Replacing CPU Modules

Your system contains two redundant CPU modules that are accessible from the front of the server unit.

The following subsections provide the procedures for removing and installing CPU modules.

Removing a CPU Module

1. Observe the safety and ESD precautions listed at the beginning of this chapter.
2. Unlock and open the front door on the tower cabinet or front covers on the rack-mount system. See *Opening and Closing the Front Door of the Tower Cabinet* earlier in this chapter or *Removing and Installing the Front Covers of the Rack-Mount System* earlier in this chapter.
3. Ensure that the CPU module is off-line by viewing its status LED indicators (See Figure 4-5). The state of the status LEDs should be as follows:

   Fail lamp: Red

   State lamp: Off

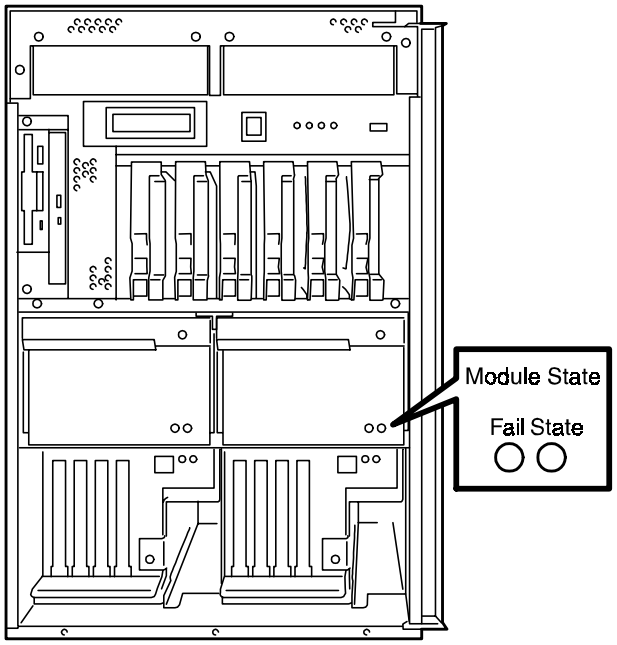


Figure 4-5. CPU Module Status LED Indicators

4. Unscrew and remove the knurled screw securing the locking handle to the CPU module. See Figure 4-6.

Note: Removing the knurled screw deactivates an interlock switch that removes power to the CPU module.

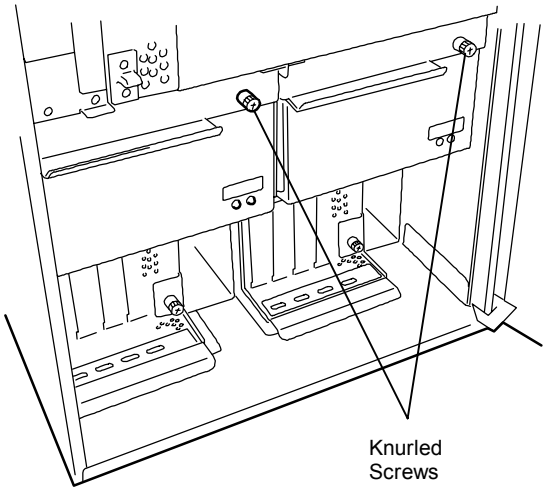


Figure 4-6. Removing the Knurled Screw Securing the Locking Handle

5. Pull the locking handle all the way down to its unlocked position. This disconnects the CPU module from its backplane. Then using the locking handle, pull the CPU module out of the chassis just enough so that you can support the module with both hands. See Figure 4-7.

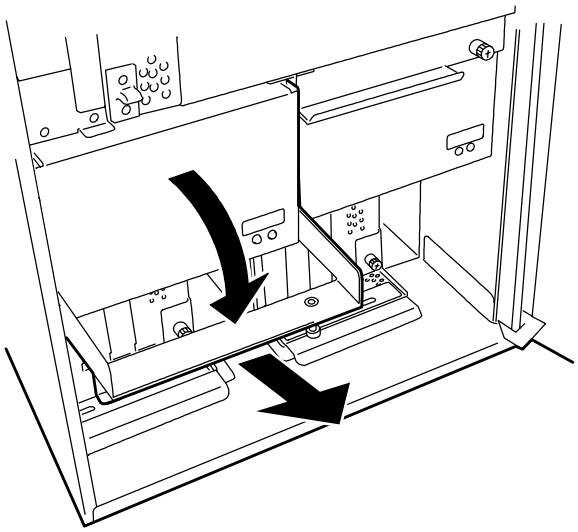


Figure 4-7. Releasing the Locking Handle and CPU Module

6. Then carefully remove the module from the server unit and place it on a flat sturdy surface. See Figure 4-8.

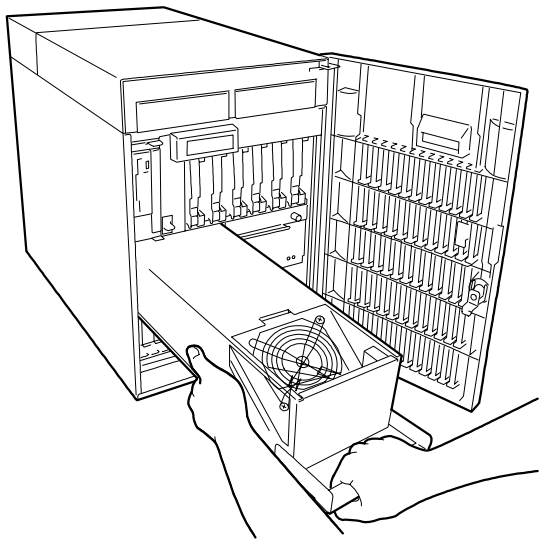
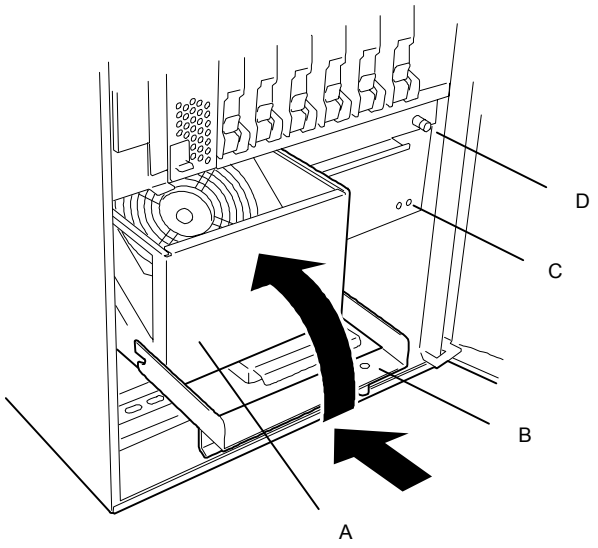


Figure 4-8. Removing the CPU Module

Installing a CPU Module

1. Observe the safety and ESD precautions listed at the beginning of this chapter.
2. Position the locking handle on the front of the CPU module in the down unlocked position. See Figure 4-9.
3. Support the CPU module with both hands and carefully slide it into the chassis until it is firmly seated in its connector.
4. Push the locking handle all the way up to its locked position.
5. Insert and hand-tighten the knurled screw that fastens the locking handle to the CPU module.

> ***Note:*** Hand-tighten the knurled screw only as much required to activate the interlock switch that allows power to be applied to the CPU module.



A CPU module
B Locking handle down (unlocked position)
C State LED (lights green when power is applied to the CPU module)
D Knurled screw

Figure 4-9. Installing the CPU Module

6. Close and lock the front door on the tower cabinet or front covers on the rack-mount system. See *Opening and Closing the Front Door of the Tower Cabinet* earlier in this chapter or *Removing and Installing the Front Covers of the Rack-Mount System* earlier in this chapter.

Replacing or Adding Processors and VRMs

The following subsections provide the procedures for removing and installing the Pentium *III*® processor. Use these procedures when replacing or adding processors to your system. When adding a second processor to a CPU module an identical processor must be added to the other CPU module to provide total system redundancy and mirroring. Each processor includes a thermal cool sheet (heat radiation sheet) and a heat sink. The processors are also supported by one or more voltage regulator modules (VRMs) depending on the number of installed processors.

Each processor installs in a processor socket on a CPU board located in the CPU module. Each processor socket must contain either a processor or a terminator board (if there are less than two processors installed.) The VRM modules are installed in VRM sockets adjacent to the processors.

Note: Your system may have up to two processors on a CPU board. All installed processors must be matched for speed. If replacing a processor, the replacement processor must match the speed of all installed processors. If upgrading a processor, all processors must be upgraded to match.

⚠ CAUTION

Electrostatic discharge (ESD) can damage components; place them on an antistatic surface. Update the CPU board using an antistatic wrist strap attached to chassis ground.

⚠ WARNING

If the system was running, any processor and heat sink installed is hot. To avoid the possibility of a burn, let the components cool for 10 minutes before continuing with these procedures.

Installing a Processor

1. Remove the appropriate CPU module from the server chassis. See *Removing a CPU Module* earlier in this chapter.
2. Remove the two screws from the rear of the CPU module securing its top cover. See Figure 4-10.

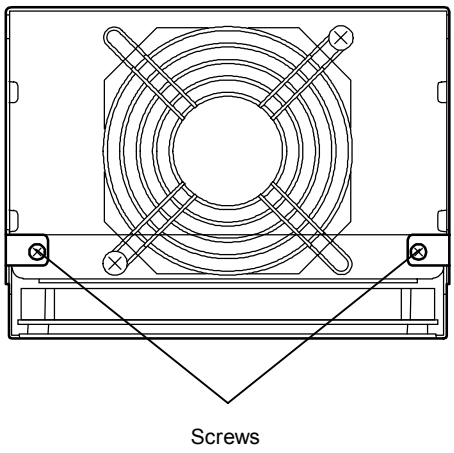


Figure 4-10. Removing the Two Screws Securing the Top cover of the CPU Module

3. Remove the top cover of the CPU module by sliding it slightly towards the rear of the module until it stops and its hooks disengage from the tab slots in the module chassis and then pull it straight up. See Figure 4-11.

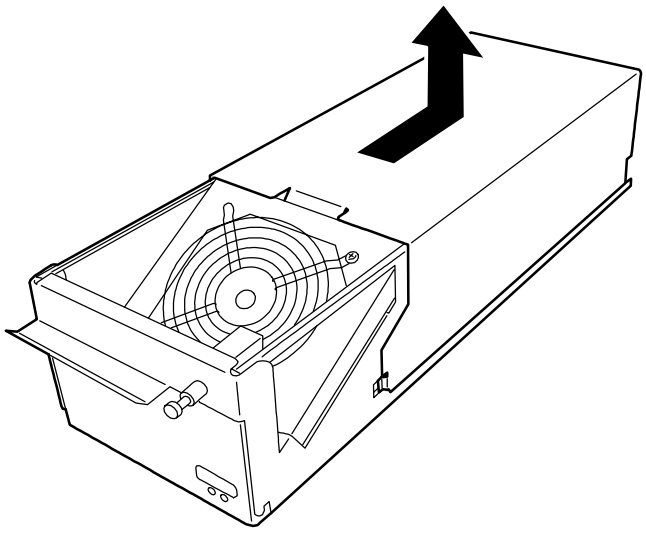
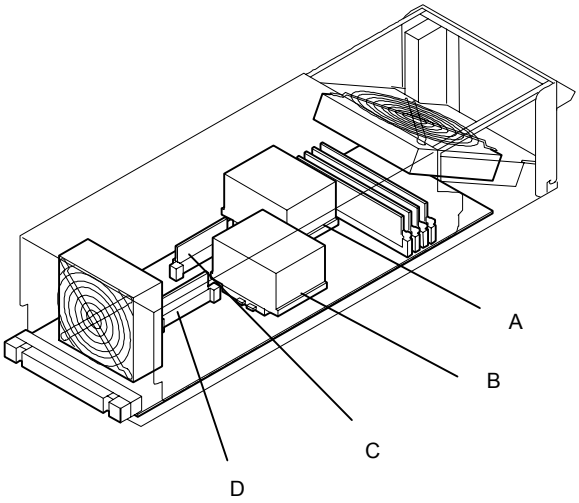


Figure 4-11. Removing the Top cover of the CPU Module

4. Locate the two processor sockets and two VRM sockets on the CPU board inside the CPU module. See Figure 4-12.



A Terminator board/Processor #2
B Processor #1
C VRM for Processor #2
D VRM for Processor #1

Figure 4-12. CPU Board Component Locations

5. If you are adding another processor to your system, then you must remove the terminator board from the socket where you are adding the processor and store the terminator board appropriately.

- To remove a terminator board, perform step 7. Otherwise, go to step 6.

6. If you are replacing a processor, leave the terminator board intact and remove the processor.

7. Raise the lever on the socket to its up position and remove the terminator or processor. See Figure 4-13.

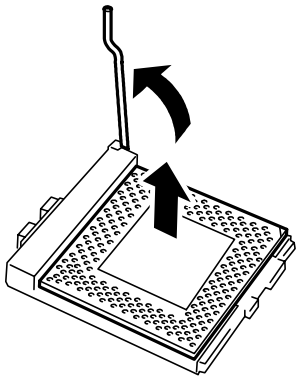


Figure 4-13. Removing a Processor or Terminator Board

8. Position the processor over the processor socket so that its pins align with the socket holes. See Figure 4-14.

> ***Note:*** Both the processor and processor socket have different pin assignments at two of its four corners to prevent misinsertion. Check the orientation pin mark and pin assignment on the socket to mount the processor correctly.

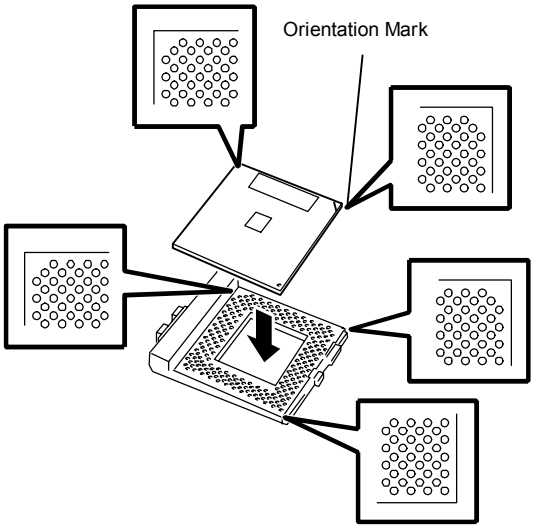


Figure 4-14. Mounting the Processor Correctly

9. Gently apply pressure equally over the top surface of the processor until it seats in the socket. The processor should fit, do not force the processor into the socket. Push the socket lever down until it snaps into the locked position. See Figure 4-15.

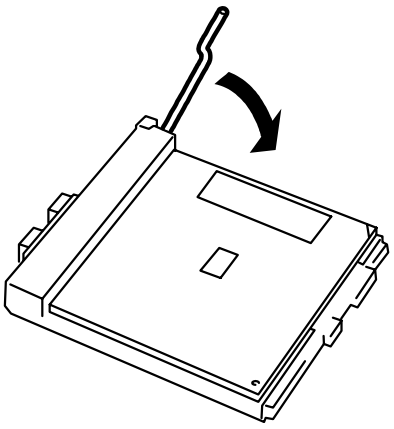


Figure 4-15. Installing a Processor

10. Very carefully apply the thermal interface material (heat radiation sheet) on top of the processor so that it is completely covered. See Figure 4-16.

> ***Notes:*** The thermal interface material is very fragile, it must be handled very carefully. If the cooling sheet is damaged, it must be replaced with a new one. Reuse of the cooling sheet is not permitted.
>
> Do not stick multiple cooling sheets on a processor, only one is needed. Keep any remaining cooling sheets as spares.

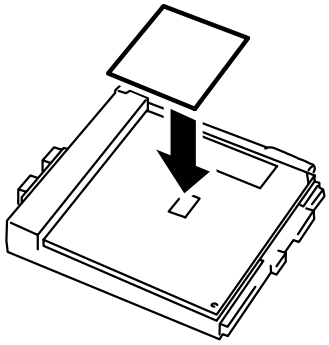


Figure 4-16. Installing the Thermal Cooling Sheet

11. Position the heat sink on the processor so that the L-channel on its bottom face fits the lever and plastic end of the socket. See Figure 4-17.

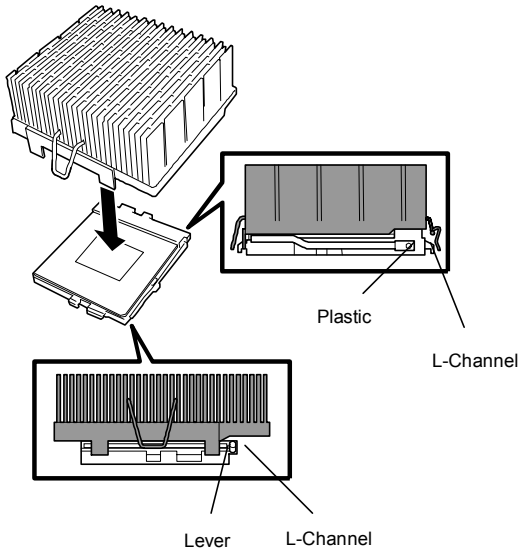


Figure 4-17. Installing the Processor Heat Sink

12. Tip the heat sink so that the wire clip on the end with no bracket fits over the tab on the base of the socket. Then insert a small screwdriver into the slot on the wire clip bracket, and hook the bracket over the other tab on the base of the socket, while pressing down on the bracket. See Figure 4-18.

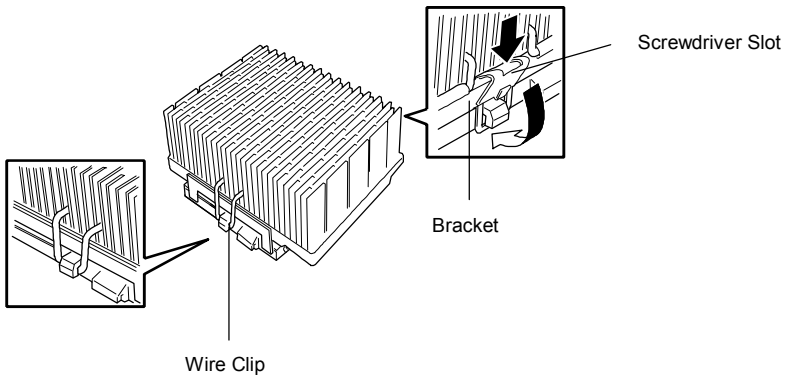


Figure 4-18. Securing the Processor Heatsink

13. Install the processor's associated VRM. Go to the next subsection *Installing a VRM.*

Installing a VRM

Each processor has a voltage regulator module (VRM) associated with it and is installed in a VRM socket adjacent to it. The VRM board connector is keyed so that it can be inserted only one way.

Perform these procedures after its associated processor is installed. See *Installing a Processor* earlier in this chapter.

1. Insert the VRM into its socket and press down evenly on the board until it is seated correctly and the socket levers click in place. The socket levers keep the VRM in place and aid in its extraction; they do not aid in the insertion of the VRM board. See Figure 4-19.

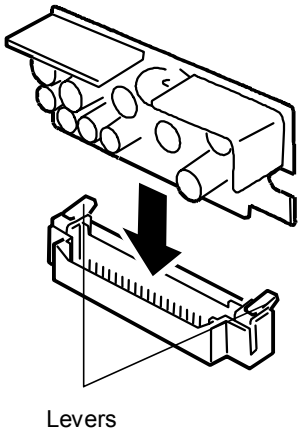


Figure 4-19. Installing a VRM

2. Repeat step 1 above if another VRM is to be installed. Otherwise, go to the next step.
3. Reinstall the top cover of the CPU module. See *Installing a Processor* earlier in this chapter.

Removing a Processor or Terminator Board

1. Remove the appropriate CPU module from the server chassis. See *Removing a CPU Module* earlier in this chapter.
2. Remove the top cover of the CPU module. See *Installing a Processor* earlier in this chapter.
3. Locate the processor or terminator board socket on the CPU board. See *Installing a Processor* earlier in this chapter.
4. If you are removing a terminator board, refer to *Installing a Processor* earlier in this chapter. Otherwise go to the next step.
5. Remove the heat sink from the top of the processor by inserting a small screwdriver into the slot on its wire clip bracket and release the wire clip bracket. See Figure 4-20.

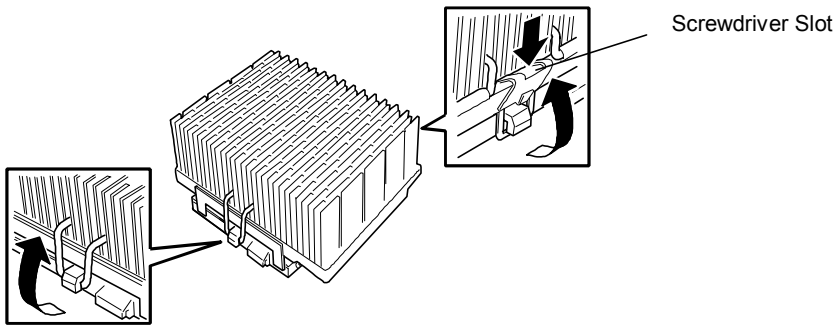


Figure 4-20. Removing the Processor Heatsink

6. Swing its processor socket lever up until it is in the unlocked position and carefully remove the processor. See Figure 4-21.

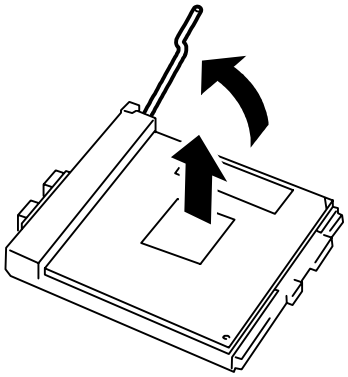


Figure 4-21. Removing the Processor

7. To remove the processor's associated VRM, go to the next subsection *Removing a VRM.*

Removing a VRM

Each processor has a voltage regulator module (VRM) associated with it and is installed in a VRM socket adjacent to it.

Perform these procedures after its associated processor is removed. See *Removing a Processor or Terminator Board* earlier in this chapter.

1. Tilt the VRM socket levers down to release the VRM from its socket. See Figure 4-22.
2. While holding both ends of the VRM pull it straight up and out of its socket.

⚠ CAUTION

DO NOT slant the VRM while pulling it up and out of its socket it may damage the connector.

3. Reinstall the top cover of the CPU module. See *Installing a Processor* earlier in this chapter.

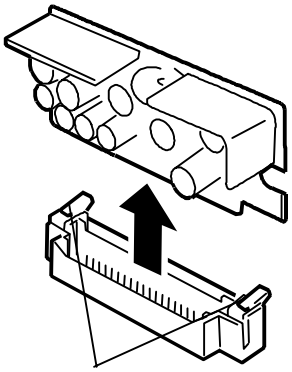


Figure 4-22. Removing a VRM

Replacing or Adding DIMMs

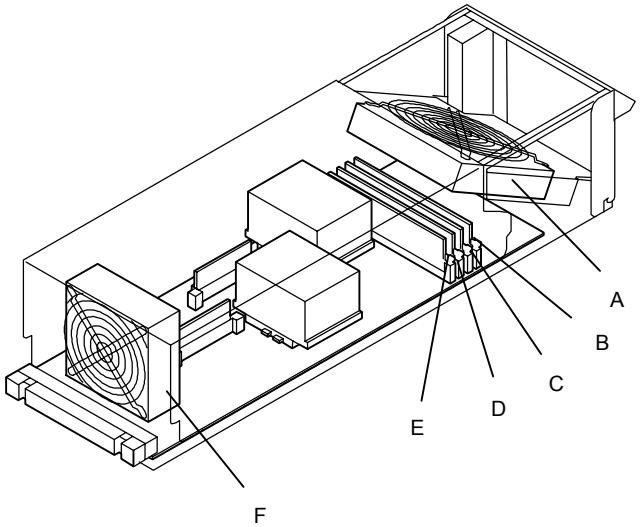
The following subsections provide the procedures for configuring and upgrading system memory. Use these procedures when replacing or adding dual inline memory modules (DIMMs) to your system. When adding or changing memory in a CPU module the same changes must be must be made to the other CPU module to provide total system redundancy and mirroring.

The CPU board contains four DIMM sockets (see Figure 4-23). DIMMs should be installed in the four sockets starting from the lowest number (DIMM#1) to the highest number (DIMM#4). Each 168-pin socket can hold a single 72-bit DIMM module with 256MB and 512MB of memory.

Note: When replacing or upgrading DIMMs the replacement DIMMs must be of the same specifications of all the installed DIMMs.

⚠ CAUTION

Electrostatic discharge (ESD) can damage components; place them on an antistatic surface. Add or replace DIMMs on the CPU board using an antistatic wrist strap attached to chassis ground.



A	Cooling Fan #1
B	DIMM #1
C	DIMM #2
D	DIMM #3
E	DIMM #4
F	Cooling Fan #2

Figure 4-23. CPU Board Component Layout

Installing DIMMs

When properly installed, the DIMM module is oriented at an angle of 90 degrees relative to the CPU board.

1. Remove the appropriate CPU module from the server chassis. See *Removing a CPU Module* earlier in this chapter.
2. Remove the top cover of the CPU module. See *Installing a Processor* earlier in this chapter.
3. Slide and remove cooling fan #1 located in the front portion of the CPU module. See Figure 4-24.

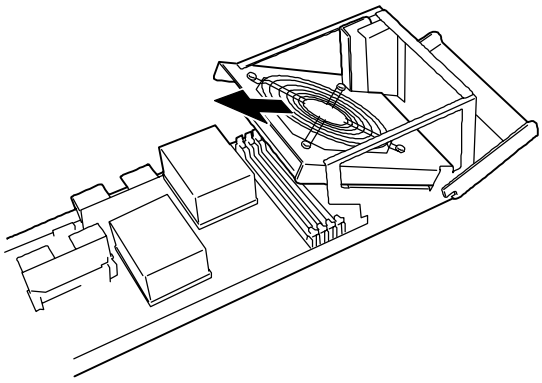


Figure 4-24. Removing Cooling Fan #1

4. Tag and disconnect the cooling fan power cable from the CPU board. See Figure 4-25.

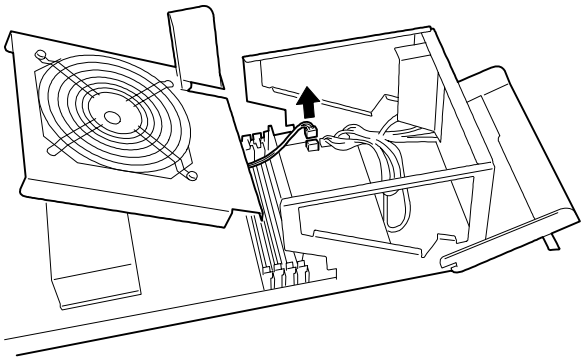


Figure 4-25. Removing the Cooling Fan Power Cable

5. If you are replacing an existing DIMM, perform "Removing DIMMs" later in this chapter and then go to step 7. Otherwise, continue with the next step.

6. Spread the latch levers located on both ends of the DIMM socket just enough to unlock the DIMM cover and remove it (see Figure 4-26).

> ***Note:*** A DIMM cover is always mounted in an empty DIMM socket.

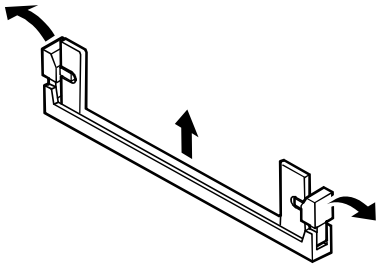


Figure 4-26. Removing a DIMM Cover

7. Holding the DIMM module only by its edges, remove it from its antistatic package.

> **⚠ CAUTION**
>
> Observe static precautions. Use an antistatic wrist strap. Hold DIMMs only by their edges.

8. DIMMs are keyed so they can only be inserted one way. Position the DIMM over the socket on the CPU board. The notches in the bottom edge of the DIMM mates with the raised bumps in the DIMM socket. See Figure 4-27.
9. Press down evenly on the DIMM until it seats correctly. The socket levers are not tools to aid in the insertion, only to keep the DIMM's in place and to aid in extraction. The levers should automatically click in place once the DIMM is fully inserted.

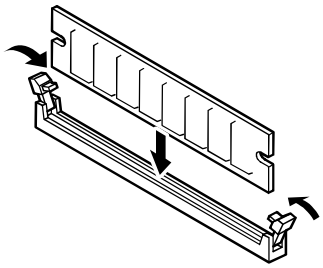


Figure 4-27. Installing a DIMM

10. Repeat steps 6 through 8 to install additional DIMMs.

11. Reconnect the power cable of cooling fan #1 to its connector on the CPU board and slide the fan back into its holder located in the front portion of the CPU module. See Figure 4-28.

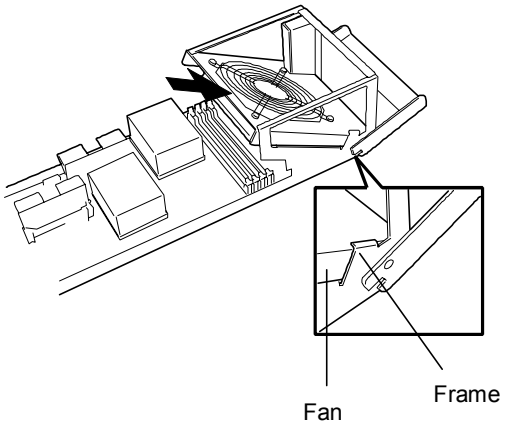


Figure 4-28. Installing Cooling Fan #1

12. Reinstall the top cover of the CPU module. See *Installing a Processor* earlier in this chapter.

Removing DIMMs

1. Remove the appropriate CPU module from the server chassis. See *Removing a CPU Module* earlier in this chapter.
2. Remove the top cover of the CPU module. See *Installing a Processor* earlier in this chapter.
3. Slide and remove cooling fan #1 located in the front portion of the CPU module. See Figure 4-24.

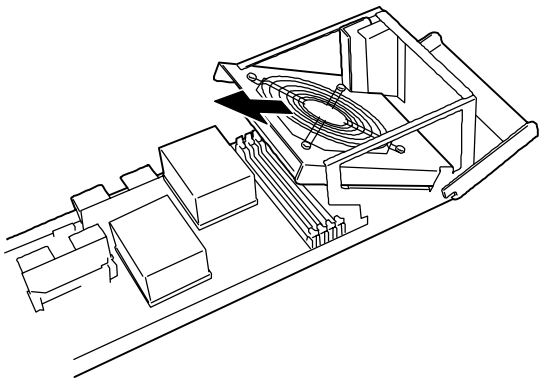


Figure 4-29. Removing Cooling Fan #1

4. Tag and disconnect the cooling fan power cable from the CPU board. See Figure 4-25.

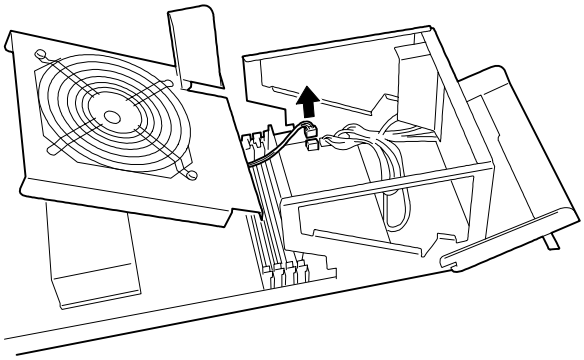


Figure 4-30. Removing the Cooling Fan Power Cable

5. Spread the latch levers located on both ends of the DIMM socket just enough to unlock the DIMM and remove it (see Figure 4-26). Store the DIMM in an antistatic package.

⚠ CAUTION

Observe static precautions. Use an antistatic wrist strap.
Hold DIMMs only by their edges.

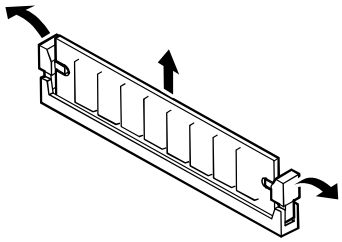


Figure 4-31. Removing a DIMM

6. Repeat Steps 5 to remove additional DIMMs.
7. If you are replacing DIMMs, perform *Installing DIMMs* earlier in this chapter, otherwise continue with the next step.
8. Install a DIMM cover in the now empty socket. See *Installing DIMMs* earlier in this chapter.
9. Reconnect the power cable of cooling fan #1 to its connector on the CPU board and slide the fan back into its holder located in the front portion of the CPU module. See Figure 4-28.

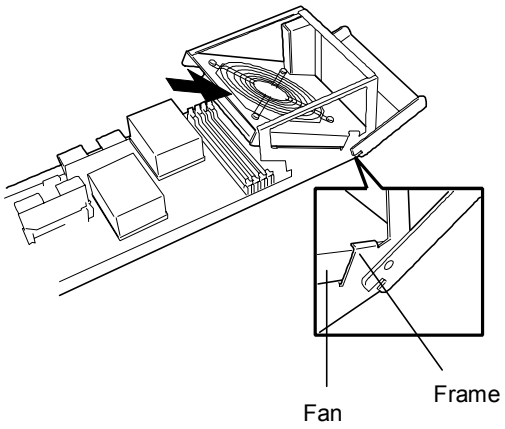


Figure 4-32. Installing Cooling Fan #1

10. Reinstall the top cover of the CPU module. See *Installing a Processor* earlier in this chapter.

Removing a PCI Module

Your system contains two redundant PCI modules that are accessible from the front of the server unit.

1. Observe the safety and ESD precautions listed at the beginning of this chapter.
2. Unlock and open the front door on the tower cabinet or front covers on the rack-mount system. See *Opening and Closing the Front Door of the Tower Cabinet* earlier in this chapter or *Removing and Installing the Front Covers of the Rack-Mount System* earlier in this chapter.
3. Ensure that the PCI module is off-line by viewing its status LED indicators (See Figure 4-33). The state of the status LEDs should be as follows:

   Fail lamp: Red

   State lamp: Off

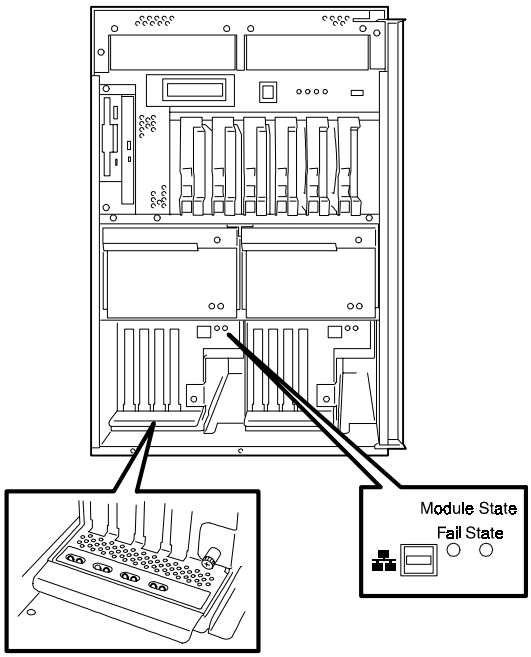


Figure 4-33. PCI Module Status LED Indicators

4. Disconnect (if connected) all PCI cables and the network cable from the front of the PCI module.

5. Unscrew and remove the knurled screw securing the locking handle to the PCI module. See Figure 4-34.

> ***Note:*** Removing the knurled screw deactivates an interlock switch that removes power to the CPU module.

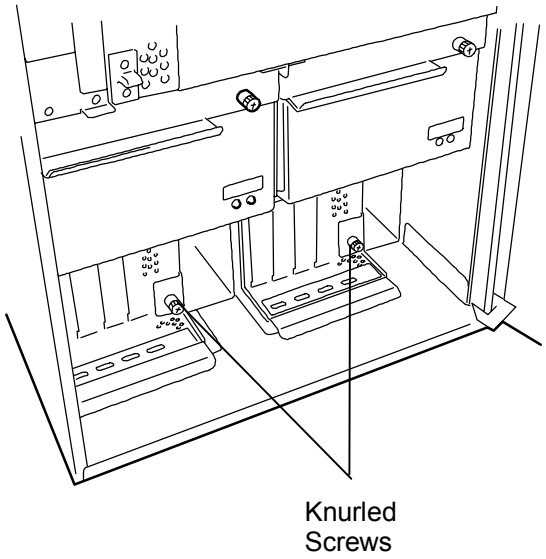


Figure 4-34. Removing the Knurled Screw Securing the Locking Handle

6. Pull the locking handle all the way up to its unlocked position. This disconnects the PCI module from its backplane. See Figure 4-35.

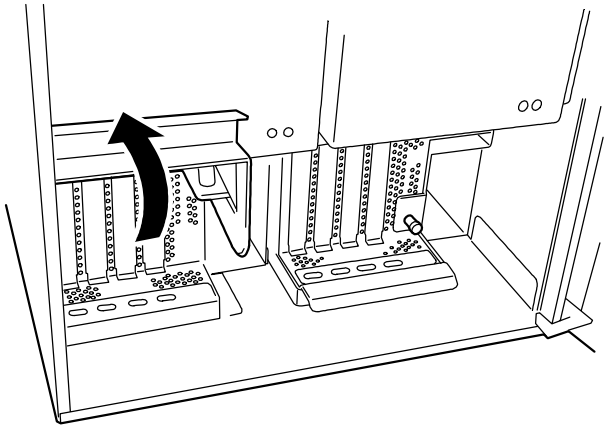


Figure 4-35. Releasing the Locking Handle and PCI Module

7. Then using the locking handle, pull the PCI module out of the chassis just enough so that you can support the module with both hands.
See Figure 4-36.

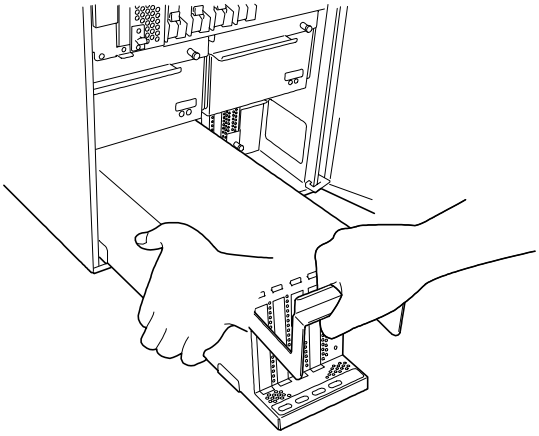


Figure 4-36. Removing the PCI Module

8. Remove the module from the server unit and carefully turn it over on its top (rotate 180 degrees) and place it on a flat sturdy surface. See Figure 4-37.

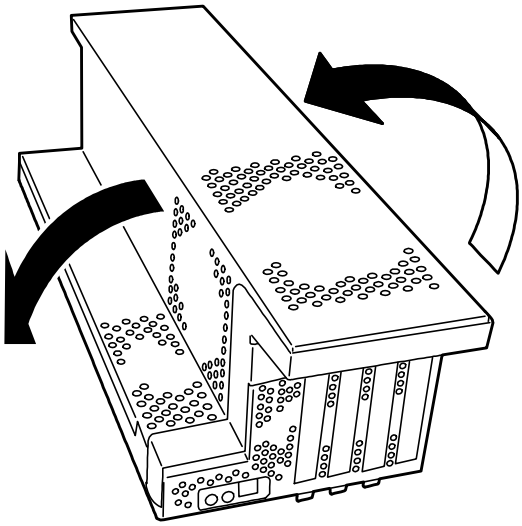


Figure 4-37. Rotating the PCI Module

Installing PCI Adapter Boards

This subsection describes how to install PCI adapter boards. Use these procedures when adding or replacing PCI adapter boards in your system. When adding, but not replacing a PCI adapter board in a PCI module an identical PCI adapter board must be added to the other PCI module to continue total system redundancy and mirroring.

Notes: All installed PCI adapter boards must have the same specifications and performance characteristics in order to provide total system redundancy and mirroring.

The BIOS Setup Utility must be run when a PCI adapter board in a PCI expansion slot is added or replaced in order to change its detailed BIOS settings, such as its interrupt line (IRQ), when required.

The PCI module board, which is located in the PCI module can have up to four 32-bit PCI adapter boards installed in its expansion slots, numbered PCI #1 to PCI #4. See Figure 4-38.

Note: PCI expansion slot #1 is dedicated to the standard video board or system management board only.

⚠ CAUTION

Electrostatic discharge (ESD) can damage components; place them on an antistatic surface. Ony handle PCI adapter boards using an antistatic wrist strap attached to chassis ground.

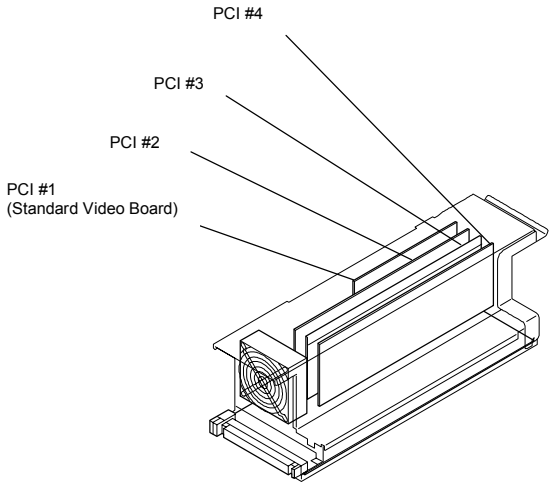


Figure 4-38. PCI Adapter Board Expansion Slots

1. Remove the appropriate PCI module from the server chassis. See *Removing a PCI Module* earlier in this chapter.
2. Remove the two screws from the rear of the PCI module securing its top cover. See Figure 4-39.

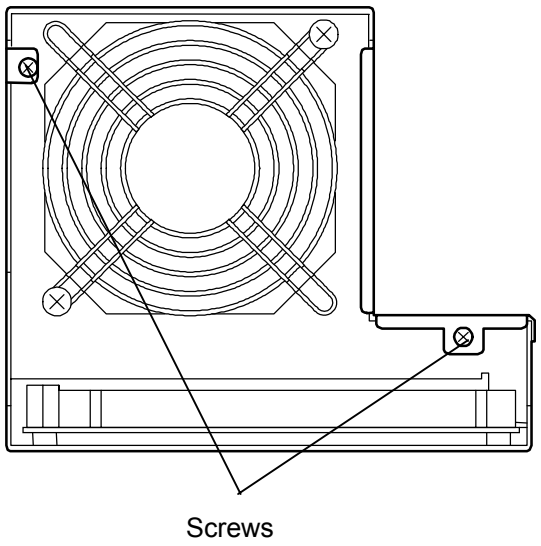


Figure 4-39. Removing the Two Screws Securing the Top cover of the PCI Module

3. Remove the top cover of the PCI module by sliding it slightly towards the rear of the module until it stops and its hooks disengage from the tab slots in the module chassis and then pull it straight up. See Figure 4-40.

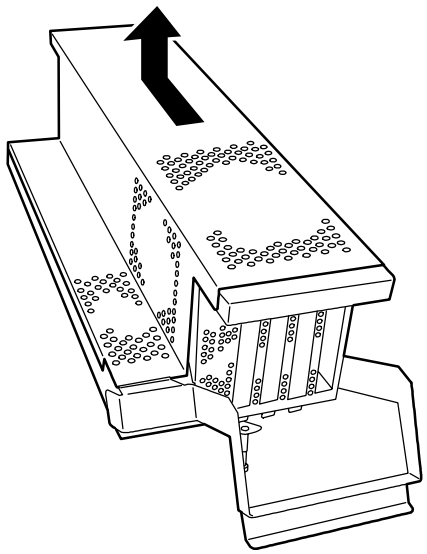


Figure 4-40. Removing the Top cover of the PCI Module

4. Determine the slot location on the PCI module board where you want to install the PCI adapter board and remove the connector cap. See Figure 4-40.

> ***Note:*** Save the connector cap removed from the PCI board slot for future use.

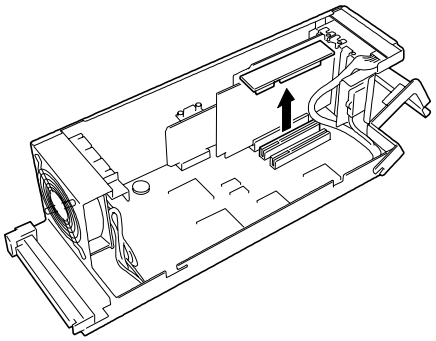


Figure 4-41. Removing the PCI Slot Connector Cap

5. Remove the PCI board from its protective wrapper, holding the board only by its edges. Do not touch the board components or its connectors.

> ***Note:*** Observe static precautions. Use an antistatic wrist strap.

6. Set any board jumpers or switches as described in the documentation that comes with the PCI board.

7. Unscrew the setscrew and remove the PCI expansion slot cover, see Figure 4-42.

> ***Note:*** Save the PCI expansion slot cover for future use.

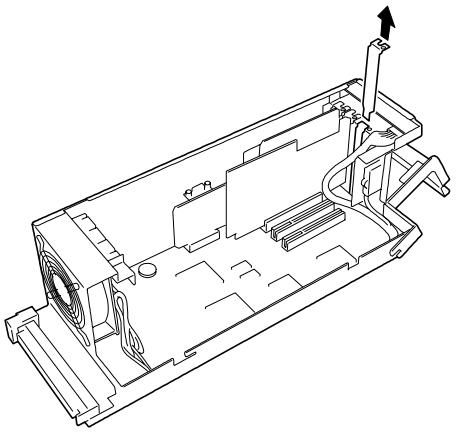


Figure 4-42. Removing the PCI Expansion Slot Cover

8. Holding the PCI board by its top edge or upper corners, firmly press the board into the PCI expansion slot on the PCI module board. The tapered foot of the PCI board retaining bracket must fit into the mating slot in the expansion slot frame. See Figure 4-43.

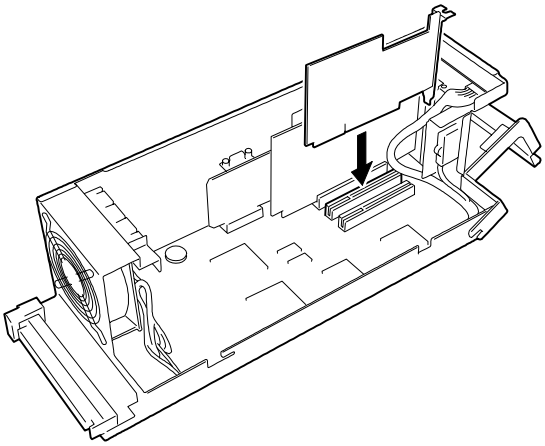


Figure 4-43. Installing the PCI Board

9. The retaining bracket fits into the space that was occupied by the PCI expansion slot cover. If you are installing a full-length PCI board you must also align the rear edge of the PCI board with the adjustable guide rail located at the top rear of the PCI module, See Figure 4-44.

   To adjust the guide rail for a full-length PCI board loosen the setscrew and slide the bracket until a slot is open in the guard rail that corresponds to the PCI board position. Then install the board and secure the bracket with the setscrew.

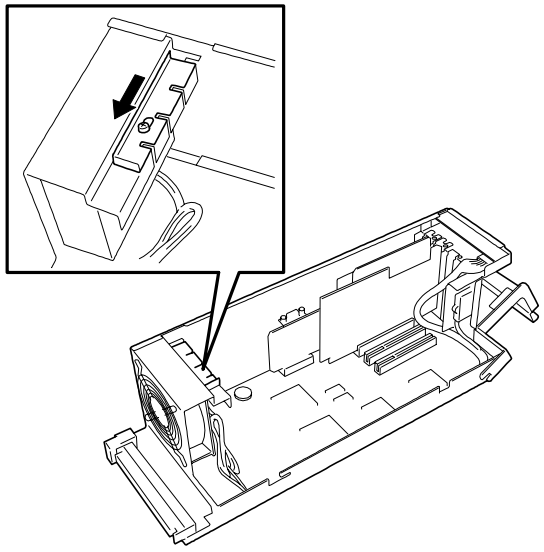


Figure 4-44. Adjusting the Guard Rail Assembly

10. Secure the PCI board retaining bracket to the expansion slot frame with the setscrew removed in step 5. See Figure 4-45.

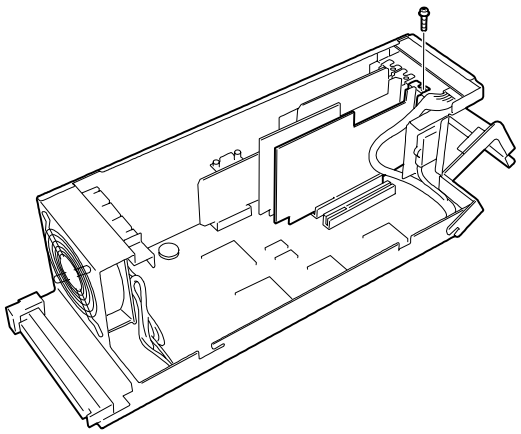


Figure 4-45. Securing the PCI Board Retaining Bracket

11. Reinstall the top cover of the PCI module and ensure that its hooks mate with the tab slots of the PCI module chassis. Then slide the cover towards the front of the PCI module chassis until its hooks are fully engaged in the chassis. See Figure 4-46.

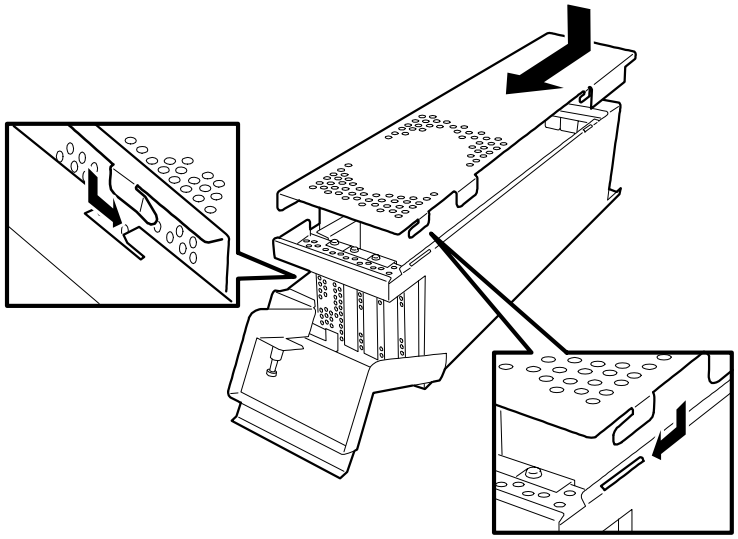


Figure 4-46. Installing the PCI Module Top Cover

12. Secure the top cover of the PCI module with the two screws removed from the rear of the module in step 2.

13. Go to *Installing a PCI Module* later in this chapter.

Removing PCI Adapter Boards

This subsection describes how to remove PCI adapter boards. Use these procedures when removing or replacing PCI adapter boards in your system. When removing, but not replacing a PCI adapter board in a PCI module an identical PCI adapter board must be removed from the other PCI module to continue total system redundancy and mirroring.

> ***Notes:*** All installed PCI adapter boards must have the same specifications and performance characteristics in order to provide total system redundancy and mirroring.
>
> The BIOS Setup Utility must be run when a PCI adapter board in a PCI expansion slot is removed or replaced in order to change its detailed BIOS settings, such as its interrupt line (IRQ), when required.

The PCI module board, which is located in the PCI module can have up to four 32-bit PCI adapter boards installed in its expansion slots, numbered PCI #1 to PCI #4. See Figure 4-47.

> ***Note:*** PCI expansion slot #1 is dedicated to the standard video board or system management board only.

> **⚠ CAUTION**
>
> Electrostatic discharge (ESD) can damage components; place them on an antistatic surface. Ony handle PCI adapter boards using an antistatic wrist strap attached to chassis ground.

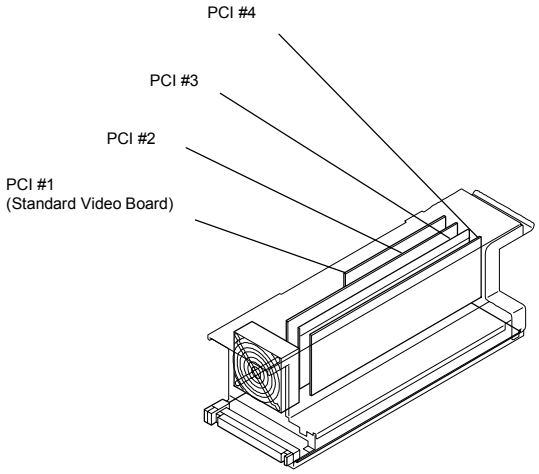


Figure 4-47. PCI Adapter Board Expansion Slots

1. Perform steps 1 through 3 of the previous subsection *Installing PCI Adapter Boards*.
2. Determine the PCI board retaining bracket that corresponds to the desired expansion slot and remove its setscrew. See Figure 4-48.

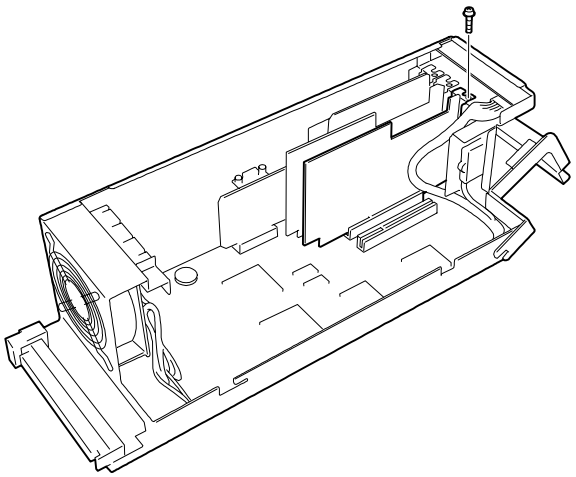


Figure 4-48. Removing the PCI Board Retaining Bracket Screw

3. Hold the PCI board at each end, and carefully rock it back and forth until the edge connectors pull free. Make sure that you do not scrape the board against other components.
4. Remove the board from the expansion slot and place it in an antistatic wrapper.
5. If you are replacing a board, go to previous subsection *Installing PCI Adapter Boards*, otherwise continue.
6. Install a PCI expansion slot cover over the vacant slot. Secure the expansion slot to the expansion slot frame with its setscrew removed in step 2.
7. Install a connector cap over the vacant PCI board slot.
8. Perform steps 9 through 11 of the previous subsection *Installing PCI Adapter Boards*.

Installing a PCI Module

1. Observe the safety and ESD precautions listed at the beginning of this chapter.
2. Ensure that the locking handle on the front of the PCI module is in the up unlocked position.
3. Support the PCI module with both hands and carefully slide it into the chassis until it is firmly seated in its connector.
4. Swing the locking handle all the way down to its locked position.

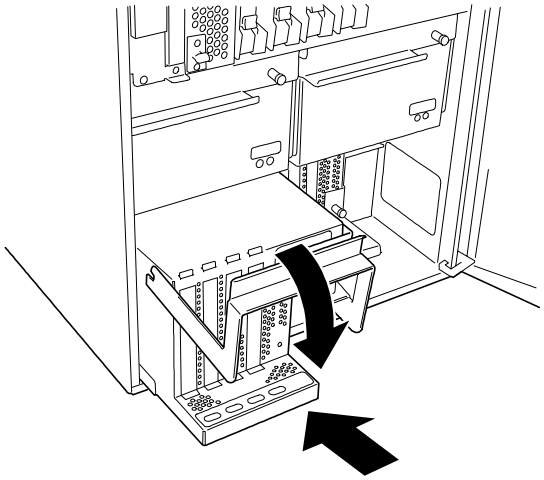


Figure 4-49. Securing the Locking Handle of the PCI Module

5. Hand-tighten the knurled screw that fastens the locking handle to the PCI module.

> ***Note:*** Hand-tighten the knurled screw only as much required to activate the interlock switch that allows power to be applied to the PCI module.

6. Reconnect (if disconnected) all PCI cables and the network cable to the front of the PCI module.
7. Close and lock the front door on the tower cabinet or front covers on the rack-mount system. See *Opening and Closing the Front Door of the Tower Cabinet* earlier in this chapter or *Removing and Installing the Front Covers of the Rack-Mount System* earlier in this chapter.

Replacing or Adding Disk Drives

The following sections provide procedures for installing a disk drive, removing a disk drive, or swapping out a faulty disk drive from one of the hot-swap SCSI hard disk drive bays. The 3.5-inch SCSI drives must use the industry standard 80-pin Single Connector Attachment (SCA) connector. Each drive must be installed in a carrier.

> ***Note:*** To order a carrier, contact your sales representative or dealer.

The hard disk drive storage bays can house up to six hard disk drives, which when mirrored results into three logical drives, see *Storage Bays* in chapter 1. The physical disk drive slots are numbered 1 to 6 (left to right), but the SCSI ID is numbered 0, 1, 2, 0, 1, 2. When mirrored into two pair of three logical disk drives, the first mirrored pair consists of hard disks 1 and 4 (SCSI ID 0), the other two disk mirrored pairs are hard disks 2 and 5 (SCSI ID 1) and hard disks 3 and 6 (SCSI ID 2).

> ***Note:*** It is recommended that a disk drive with the smallest storage capacity be installed as the boot disk. The first mirrored pair of disk drives (SCSI ID 0) contains the system's boot software and is known as the boot disk.

- If installing new drives, follow an installation scheme starting with the left drive (lowest-numbered storage slot), as viewed from the front of the system. Fill the storage bays left to right, always installing the drives in pairs.
- DO NOT remove a disk drive if its green light is flashing indicating that the disk is being accessed.
- DO NOT remove a working disk drive if the yellow light is lit on its mirrored disk drive; permanent data loss will occur.
- If an individual SCSI drive fault LED (yellow light) is on steadily, this indicates that the drive has been flagged as faulty. Follow the procedure described in this section to remove the faulty drive and swap in a good one.

> ***Note:*** ESD can damage disk drives, boards, and other parts. This system can withstand normal levels of environmental ESD while you are hot-swapping SCSI hard drives. However, we recommend that you do all procedures in this chapter only at an ESD workstation or provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground (any unpainted metal surface) on your system when handling parts.

Installing a Hard Disk Drive

1. Observe the safety and ESD precautions listed at the beginning of this chapter.
2. Unlock and open the front door on the tower cabinet or front covers on the rack-mount system. See *Opening and Closing the Front Door of the Tower Cabinet* earlier in this chapter or *Removing and Installing the Front Covers of the Rack-Mount System* earlier in this chapter.
3. Determine which hard disk drive bay slot will house the new hard drive.
4. Pull the lock lever of the dummy drive carrier (identified by white lock lever) towards you and remove the carrier from its slot, see Figure 4-50.

Note: The dummy drive carrier is provided to maintain proper cooling. Leave the dummy drive carrier in unused slots, and keep all removed dummy drive carriers for future use.

⚠ CAUTION

Do not insert your hand or any tool into the slot with the disk tray or dummy drive carrier removed. Failure to follow this caution may cause an electric shock or fire.

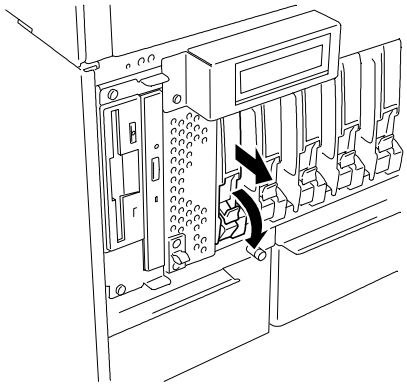


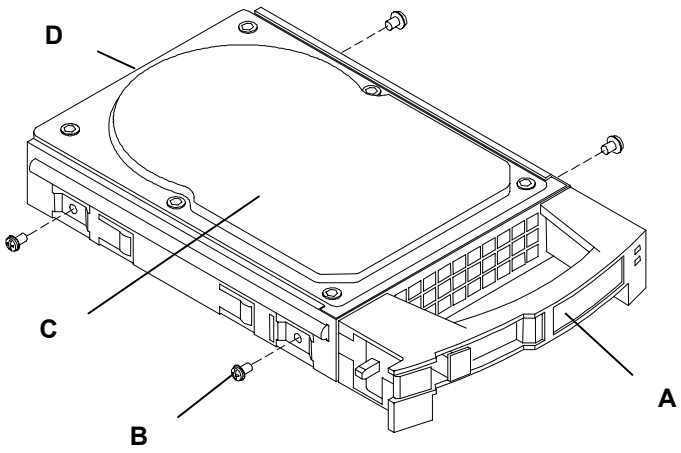
Figure 4-50. Unlocking a Dummy Drive Carrier

Note: Observe static precautions. Use an antistatic wrist strap.

5. The drive carrier is shipped with the add-on drive. Remove the new drive from its protective wrapper and place it on an antistatic surface.

6. Position the drive so its SCA connector is near the top surface of the drive. Place the drive on the antistatic surface again. Slide the drive into the carrier with its SCA connector facing toward the rear of the carrier (open end).

7. While holding the drive in the carrier with your left hand, align the drive's screw holes with the carrier's screw holes and insert the four screws of appropriate size and length (see Figure 4-51).



Installing 3 1/2inch hard disk drive in carrier for hot-swap bays

A Carrier

B Four screws

C Hard disk drive

D SCA connector

Figure 4-51. Installing Hard Disk Drive in a Carrier

8. Unlock the lock lever located at the bottom of the carrier handle, see Figure 4-52.

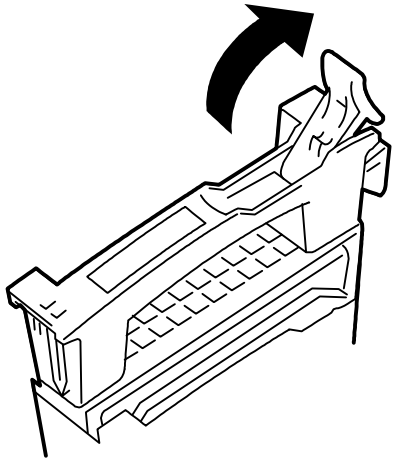


Figure 4-52. Unlocking the Carrier Lock Lever

9. Hold the handle of the hard disk drive carrier firmly and insert the carrier into the slot until the hook at the bottom of the lock lever engages the frame, see Figure 4-53.

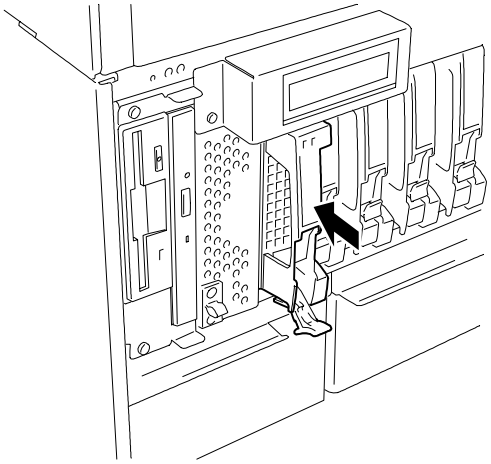


Figure 4-53. Engaging the Carrier Lock Lever

10. Push the lock lever toward the hard disk drive bay until the handle is completely locked. The lever clicks when it is locked. See Figure 4-54.

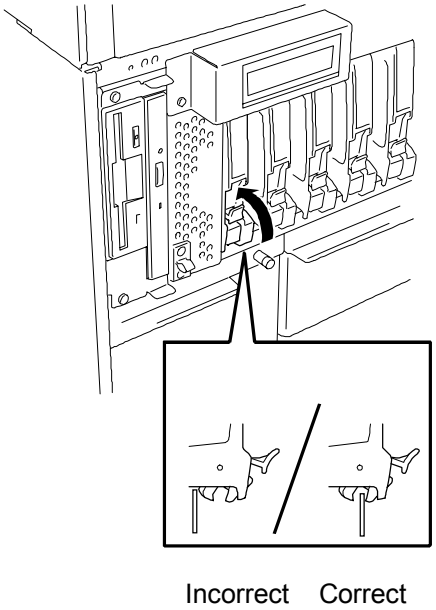


Figure 4-54. Securing the Hard Disk Drive Carrier

11. Close and lock the front door on the tower cabinet or front covers on the rack-mount system. See *Opening and Closing the Front Door of the Tower Cabinet* earlier in this chapter or *Removing and Installing the Front Covers of the Rack-Mount System* earlier in this chapter.

Removing a Hard Disk Drive

1. Observe the safety and ESD precautions listed at the beginning of this chapter.
2. Unlock and open the front door on the tower cabinet or front covers on the rack-mount system. See *Opening and Closing the Front Door of the Tower Cabinet* earlier in this chapter or *Removing and Installing the Front Covers of the Rack-Mount System* earlier in this chapter.
3. Determine which hard disk drive bay slot contains the hard drive you want to remove.
4. Grasp the handle of the hard disk's carrier and unlock the lever located at the bottom of the carrier handle, see Figure 4-55. The hard disk carrier will come out approximately 1/2-inch so that its handle is fully accessible in order to pull the carrier the rest of the way out of the bay.

> ***Note:*** After the drive is disconnected from its backplane wait approximately 10 seconds for the drive to spin down before removing it from the storage bay.

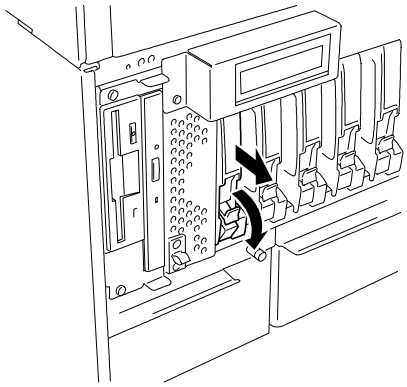


Figure 4-55. Removing a Hard Disk Drive

5. Remove the hard disk drive and place it in an antistatic wrapper.
6. If another hard disk drive is not going to be installed into the vacant slot then a dummy drive carrier must be. This will ensure proper system cooling.
7. Close and lock the front door on the tower cabinet or front covers on the rack-mount system. See *Opening and Closing the Front Door of the Tower Cabinet* earlier in this chapter or *Removing and Installing the Front Covers of the Rack-Mount System* earlier in this chapter.

Hot-Swapping a Hard Drive

If you are swapping out a faulty hard drive, you can determine which drive to remove by checking its Disk Drive Status LEDs. See "Status LED Indicator Descriptions" in Chapter 1.

> ***Note:*** When the Disk Error LED indicates a drive fault (steady amber light), you can remove the drive and swap in a replacement at any time without needing to power down the system. Drive manufacturer's caution against moving a drive that is still spinning because of possible damage to the drive. Also, when the Disk Error LED indicates that the hard disk drive is being rebuilt (flashing amber light) do not remove the drive.

1. Observe the safety and ESD precautions listed at the beginning of this chapter.
2. Unlock and open the front door on the tower cabinet or front covers on the rack-mount system. See *Opening and Closing the Front Door of the Tower Cabinet* earlier in this chapter or *Removing and Installing the Front Covers of the Rack-Mount System* earlier in this chapter.
3. Check all the hard disk drive status LEDs to confirm which faulty drive to remove. Each drive has two status indicators located on its front handle. See *Table 1-2. Disk Drive Status LED Panel Indicators* in Chapter 1.

   > ***Note:*** Depending on the drive fault, the drive may be still spinning when you remove it. Follow the next step exactly when removing drives.

4. Grasp the handle of the hard disk's carrier and unlock the lever located at the bottom of the carrier handle, see Figure 4-55. Pull the faulty drive out of the bay far enough to disengage the drive connector from the backplane. Wait approximately 10 seconds until the drive spins down, then remove the drive from the bay.

   > ***Note:*** Observe static precautions. Use an antistatic wrist strap.

5. Place the removed hard drive on an antistatic surface.
6. Remove the replacement drive from its protective wrapper and place it on an antistatic surface. If a drive carrier was not shipped with the replacement drive, use the carrier from the removed drive.
7. Place the removed hard drive in an antistatic wrapper.
8. Perform steps 5 through 11 of the previous subsection *Installing a Hard Disk Drive*.

Replacing the Device Module

Your system contains two standard PC AT compatible peripheral devices that are housed in the device module. The standard peripheral devices are as follows:

- Super floppy disk drive
- 24X CD-ROM drive (supports 650 MB CD media).

The device module is a single CRU and is not hot-pluggable.

You must open the front door of the tower cabinet or the front cover of the rack-mount system to turn the server power off before removing or installing the device module.

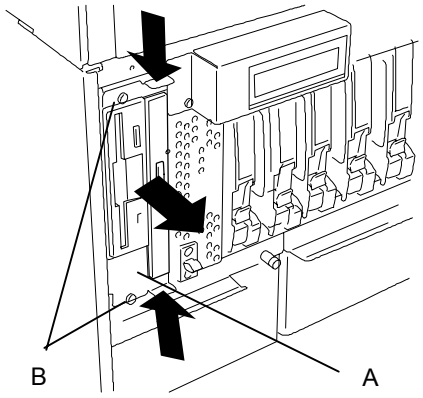
⚠ CAUTION

CD-ROM devices contain a laser system and are classified as CLASS 1 LASER PRODUCTS. In case of any trouble with a CD-ROM, please contact your nearest service representative. To prevent direct exposure to the laser beam, do not try to open the enclosure.

Use of controls or adjustments or performance of procedures other than those recommended by the manufacturer may result in hazardous radiation exposure.

To replace the device module perform the following procedures (see Figure 4-56).

1. Observe the safety and ESD precautions listed at the beginning of this chapter.
2. Unlock and open the front door on the tower cabinet or front covers on the rack-mount system. See *Opening and Closing the Front Door of the Tower Cabinet* earlier in this chapter or *Removing and Installing the Front Covers of the Rack-Mount System* earlier in this chapter.
3. Power off the system. Ensure the power cords are unplugged from the AC wall outlet.
4. Remove the two screws securing the device module to the front panel of the cabinet.
5. While holding the upper and lower tabs protruding from the device module carefully pull it out of the cabinet.



A Device module
B Screws

Figure 4-56. Removing the Device Module

6. To reinstall the device module in the cabinet carefully insert the module into its slot in the front panel of the cabinet.
7. Secure the device module to the front panel with the two screws removed in step 4 above.
8. Plug in the power cords and power on the system.
9. Close and lock the front door on the tower cabinet or front covers on the rack-mount system. See *Opening and Closing the Front Door of the Tower Cabinet* earlier in this chapter or *Removing and Installing the Front Covers of the Rack-Mount System* earlier in this chapter.

Replacing a Power supply

Your server system contains two standard 450-Watt power supplies that are housed in the rear of the chassis.

The power supplies are numbered 1 and 2, right to left as seen from the rear of the system. Both power supplies are CRUs and are hot pluggable and redundant. Each power supply has three status indicators that are listed along with a description of each in Table 1-6 of chapter 1.

To replace a power supply, perform the following procedures.

1. Observe the safety and ESD precautions listed at the beginning of this chapter.
3. Unplug the power cord from the AC wall outlet and from the input receptacle on the rear of the power supply you are removing. See Figure 4-57.

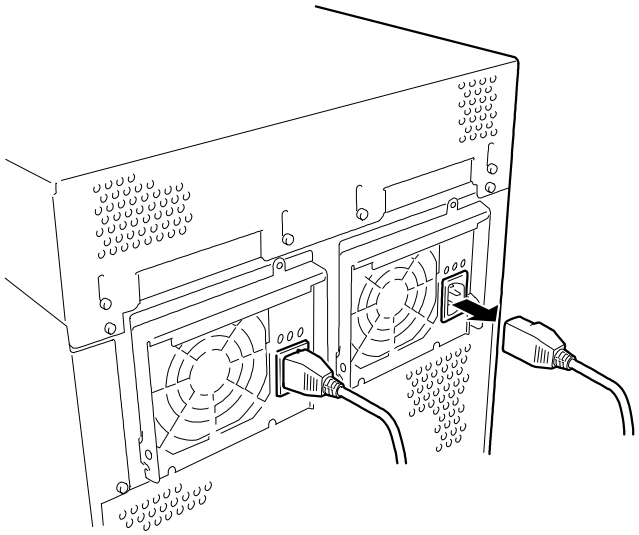
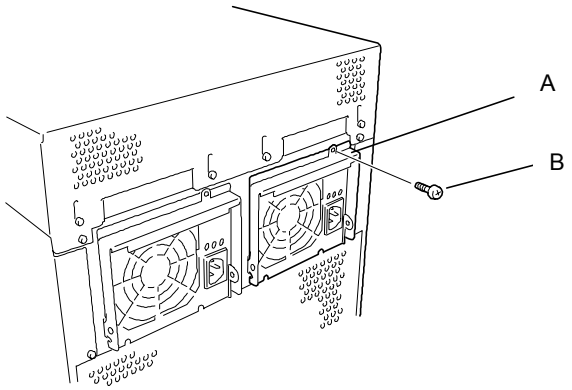


Figure 4-57. Removing the Power Cord

4. Remove the screw securing the locking handle of the power supply to the power supply bay. See Figure 4-58

> ***Note:*** Save the screw removed from the power supply bay for future use.



A Locking handle
B Screw

Figure 4-58. Removing the Locking Handle Screw

5. Pull the locking handle down to its fully opened position. This disconnects the power supply from its connector inside the bay. See Figure 4-59.
6. Use the locking handle to pull the power supply out of the bay just enough so that you can support the power supply with both hands. Then carefully remove the power supply from the bay. See Figure 4-59.

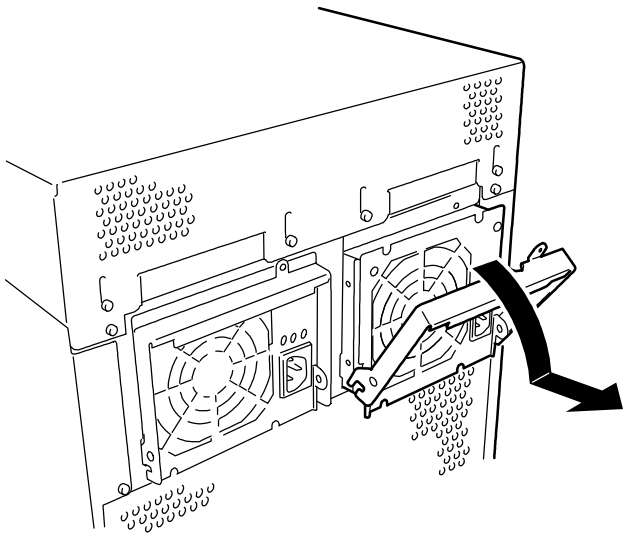


Figure 4-59. Removing the Power Supply

7. To reinstall the power supply in the cabinet make sure that its locking handle is in its unlocked position (down 45 degrees). Then insert the power supply into the power supply bay and slowly slide it inward until it is almost flush with the rear of the bay. Figure 4-60.

8. Secure the power supply by pushing its locking handle up to its fully locked position until you hear it click and then fasten with the screw removed in step 4 above. See Figure 4-60 and Figure 4-58.

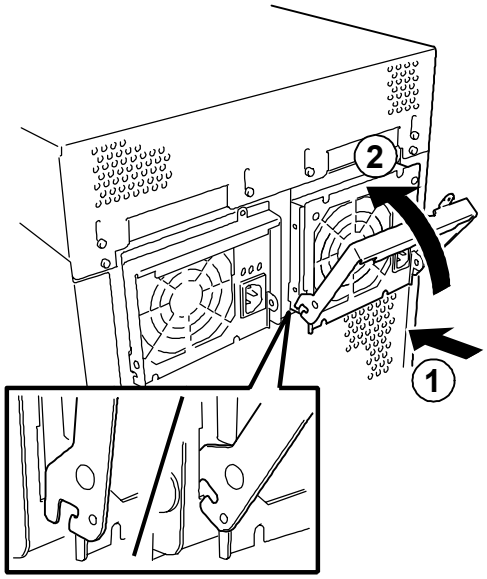


Figure 4-60. Installing the Power Supply

9. Plug one end of the power cord into the AC input receptacle on the rear of the power supply (see Figure 4-61) and connect the other end into the AC wall outlets. Verify that the power supply is operating correctly by checking that its leftmost status indicator (Power) is lit green and its other two status indicators are off.

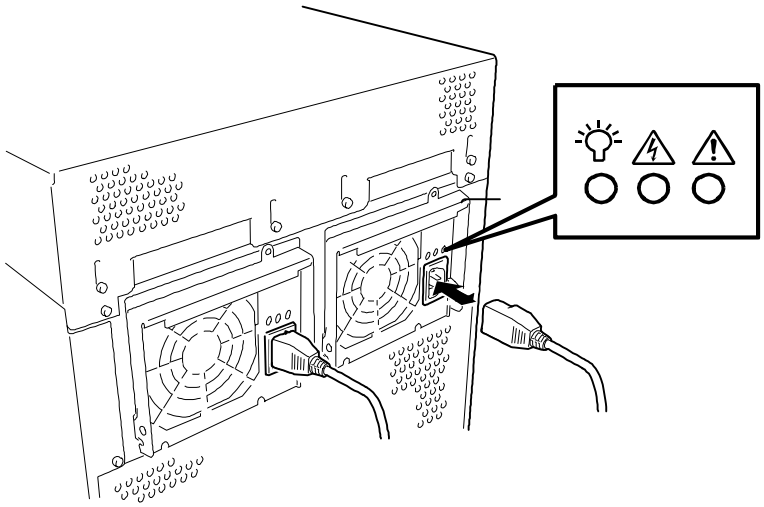


Figure 4-61. Connecting the AC Power Cord

Installing the Internal Device Bay Expansion Kit

Note: This procedure is for tower-based systems only.

The following subsections provides the procedures for installing the Internal Device Bay Expansion Kit into the tape drive module housing, which is included with tower-based systems only. After installing the expansion kit, then 5.25-inch tape backup drives can be installed in the device bays.

Before installing the Internal Device Bay Expansion Kit you must first remove the front door and the top cover of the tower-based unit. Then the new hardware components can be installed into the existing tape drive module housing.

Unpacking the Internal Device Bay Expansion Kit

Although the expansion kit hardware is inspected and carefully packaged at the factory, damage may occur during shipping. Follow these steps for unpacking.

1. Visually inspect the shipping containers; notify your carrier immediately of any damage.
2. Carefully remove the kit hardware and verify the parts listed below. If parts are missing or the hardware is damaged, notify your service representative.
   - Power supply unit
   - Cooling fan
   - Finger guard
   - Power cord
   - Power cable
   - Device DC power distribution cable
   - Internal SCSI cable (2)
   - External SCSI cable (2)
   - SCSI terminator (2)
   - SCSI 68-to-50 pin (wide-narrow) converter (2)
   - Tie wraps
   - Screw (4 pan head screws)
   - Countersunk screw (2)

Before You Begin

Before you begin, please review the following cautions, warnings, and general guidelines.

⚠ WARNING

Before doing the procedures in this subsection, make sure that your system is powered off and unplug all AC power cords. Failure to disconnect power before opening your system can result in personal injury and equipment damage. All voltage is removed only when the power cord is unplugged.

- Avoid excessive vibration and shock. Dropping an electronic component can cause serious damage.
- Do not disconnect or remove parts other than those specified in the procedure.
- Do not touch I/O connector pins.
- All screws are Phillips-head, unless otherwise specified.
- On completion of installation, perform a power-on test. If a fault occurs, verify that the installation was performed correctly. If the problem persists, see "Problem Solving" in Chapter 5.

Static Precautions

An electrostatic discharge (ESD) can damage disk drives, option boards, and other components. You can provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground when handling system components.

Electronic devices can be easily damaged by static electricity. To prevent damage, keep them in their protective packaging when they are not installed in your system.

Preparation

Use the following procedure to prepare the tower-based unit for installation of the new Internal Device Bay hardware components.

1. Observe the safety and ESD precautions listed at the beginning of this chapter.
2. Unlock and open the front door on the tower cabinet system. See *Opening and Closing the Front Door of the Tower Cabinet* earlier in this chapter.
3. Power off the system. Ensure the power cords are unplugged from the AC wall outlet.

4. Label and disconnect all peripheral cables attached to the I/O panel on the back of the server.

5. Carefully lift the front door up and pull it towards you until it is free of its top and bottom hinges and then remove it. See Figure 4-62.

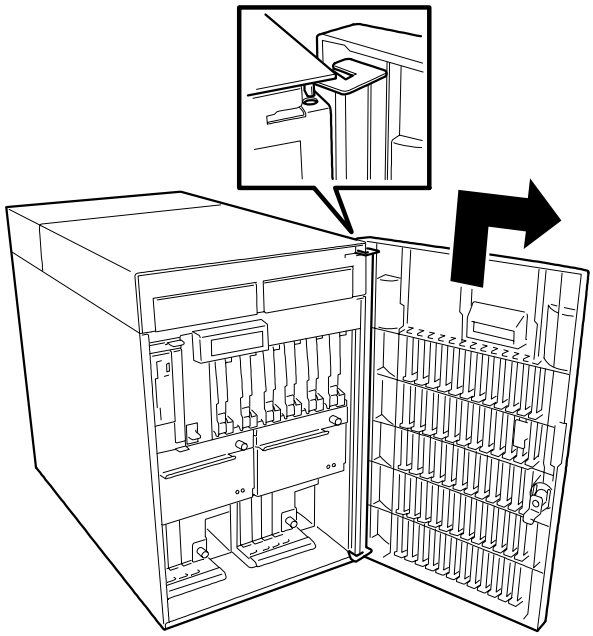


Figure 4-62. Removing the Front Door

6. Unscrew and remove the knurled screws securing the top cover to the rear of the chassis. See Figure 4-63.

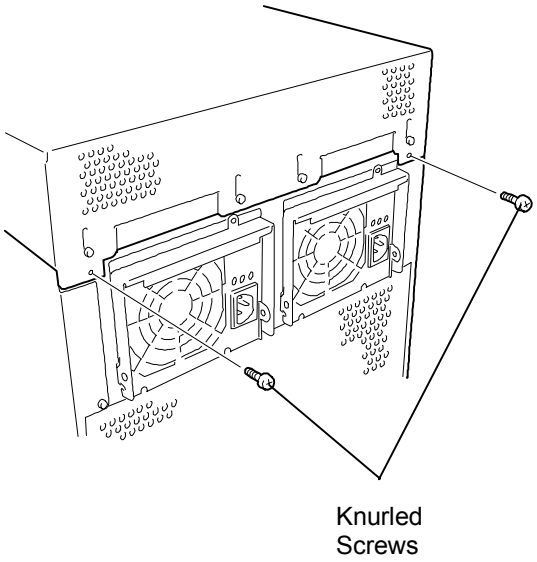


Figure 4-63. Removing the Top Cover Rear Screws

7. Remove and save the screws that attach the top cover to the front of the chassis. See Figure 4-64.

8. While facing the front of the server, push the top cover towards the back of the chassis to disengage the row of tabs attaching the cover to the chassis. Then lift it straight up and set the cover aside. See Figure 4-64.

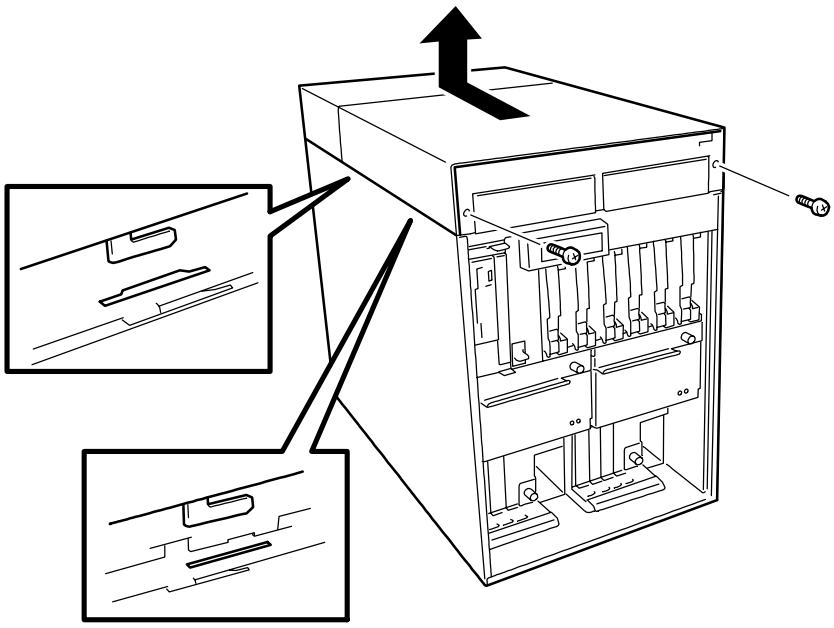


Figure 4-64. Removing the Top Cover

Installing the Internal Device Bay Expansion Kit

1. Mount the power supply unit by placing it at the rear of the tape drive module frame and engaging its bottom mounting tabs with its corresponding frame brackets, and then secure it with two screws. See Figure 4-65.

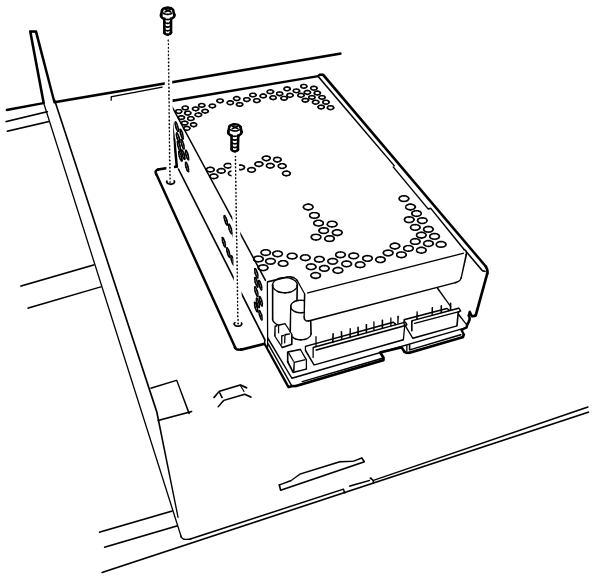
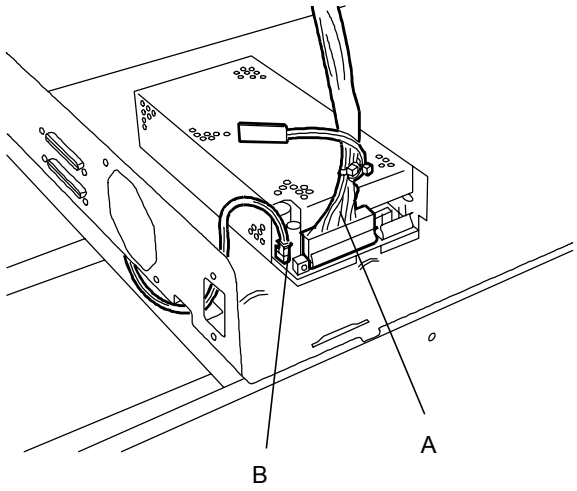


Figure 4-65. Mounting the Power Supply Unit

2. Connect the device DC power distribution cable and the white/black cable (Power Good sensor cable) coming from inside the server (taped to the bottom of the tape drive module frame) to the power unit. See Figure 4-66.

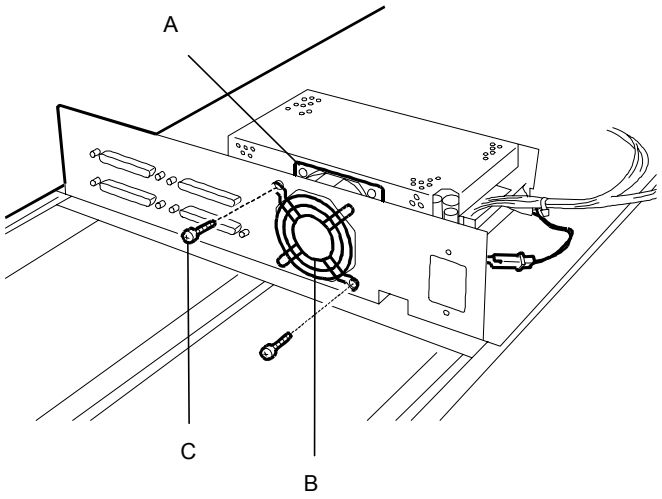


A Device DC power distribution cable

B White/black cable (PowerGood sensor cable)

Figure 4-66. Connecting the Device DC Power Distribution and White/Black Cables

3. Using the two screws, secure the cooling fan and finger guard together. See Figure 4-67.



A Fan
B Finger guard
C Screws (2)

Figure 4-67. Mounting the Cooling Fan and Finger Guard

4. Connect the fan cable to the fan cable connector on the device DC power distribution cable. See Figure 4-68.

NOTE: Check the orientation of the cooling fan using the fan cable position.

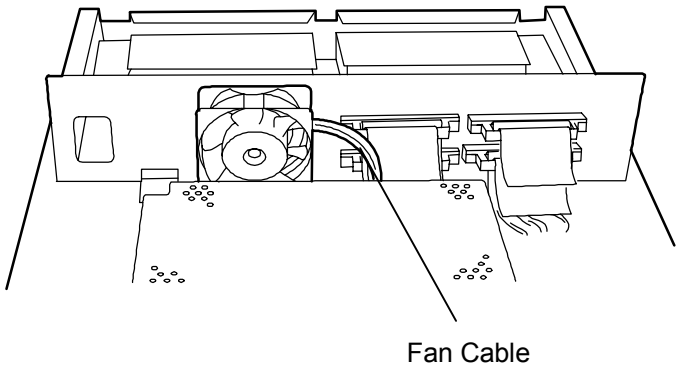


Figure 4-68. Connecting the Cooling Fan Cable

5. Pass the power cable through the rear panel cut out for the power cable connector and secure the cable connector with the two screws provided in the expansion kit. See Figure 4-69.

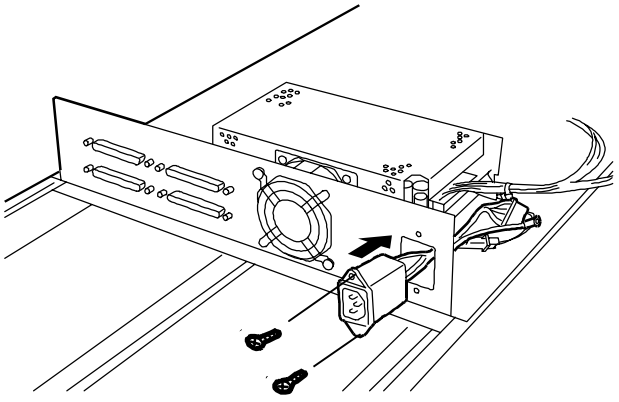


Figure 4-69. Installing the Power Cable

6. Connect the power cable to the power supply unit and secure its ground to the server chassis. See Figure 4-70.

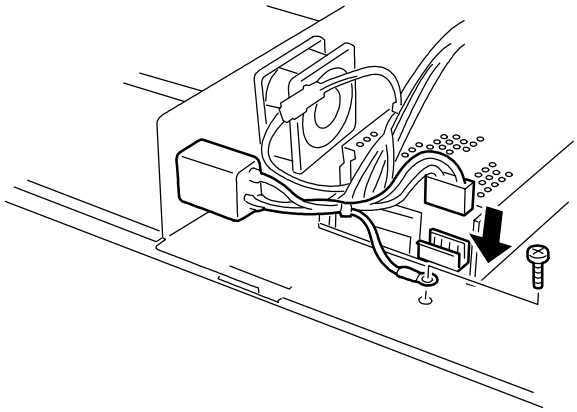
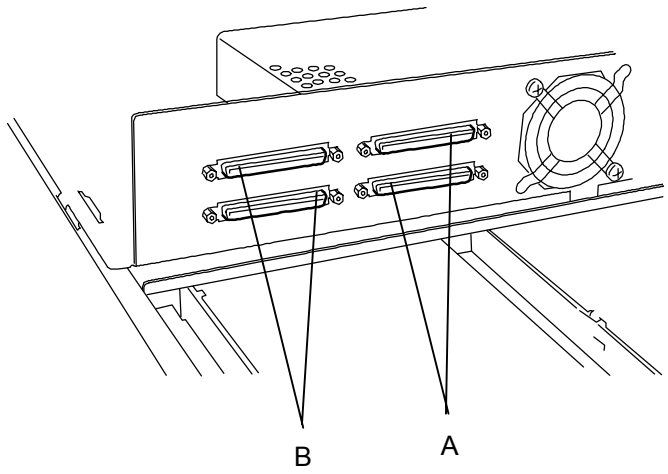


Figure 4-70. Connecting the Power Cable

7. Loosen the screws on the internal SCSI cable connectors, insert one of the internal SCSI cable connectors into the bottom right-hand side connector slot on the rear panel of the tape drive bay, and tighten the connector screws. Run and insert the other end of the internal SCSI cable to the top right-hand side connector slot and tighten its screws. The middle connector of the internal SCSI cable connector is available for a 5.25-inch tape drive. This completes installation of the internal SCSI cable for Group 1. See Figure 4-71.

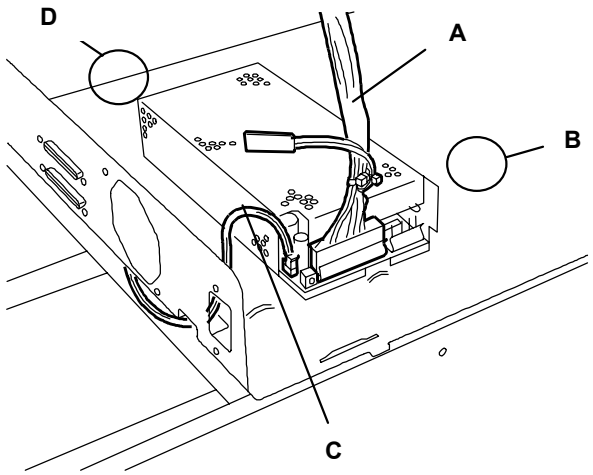
8. Repeat step 7 to install the internal SCSI cable for Group 2. The Group 2 connector slots are located on the left-hand side of the rear panel. See Figure 4-71.



A Group 1 SCSI cable connectors
B Group 2 SCSI cable connectors

Figure 4-71. Connecting the Internal SCSI Cables

9. Secure cable slack with the tie wraps provided with the expansion kit, as shown in Figure 4-72.



A Device DC power distribution cable
B In the location indicated by the circle secure the device DC power distribution cable to the chassis using tie wrap (100 mm).
C Bundle the fan cables using tie wrap (100 mm) so that they don't contact the fan blades.
D In the location indicated by the circle secure the internal SCSI cables to the chassis using tie wrap (250 mm).

Figure 4-72. Securing Internal Cable Slack

10. This completes the procedure. The power cord and SCSI terminators contained in the expansion kit are not used until a 5.25-inch tape drive is mounted. Save the power cord and SCSI terminators for future use.

11. For the information on how to install or remove a 5.25-inch tape drive, see subsection *Installing and Removing Optional 5.25-inch Tape Drives* later in this chapter.

Installing and Removing Optional 5.25-Inch Tape Drives

The optional 5.25-inch tape drives can only be mounted in a tower-based system that has the *Internal Device Bay Expansion Kit* and a SCSI controller (PCI adapter board) installed. For information on how to mount the expansion kit, see subsection *Installing the Internal Device Bay Expansion Kit* and for information on how to install a SCSI controller PCI adapter board see subsection *Installing PCI Adapter Boards* in this chapter.

Notes: Set the SCSI terminator (if present) of the 5.25-inch tape drive to **OFF**. Set the SCSI ID to a unique value that will not overlap the IDs of other devices. For setup operation, refer to the tape drive manual for setup information.

The SCSI cable connector is equipped with a 50-pin converter. Remove this converter and save it for future use. When connecting the cable, be very careful that the device does not pinch the cable.

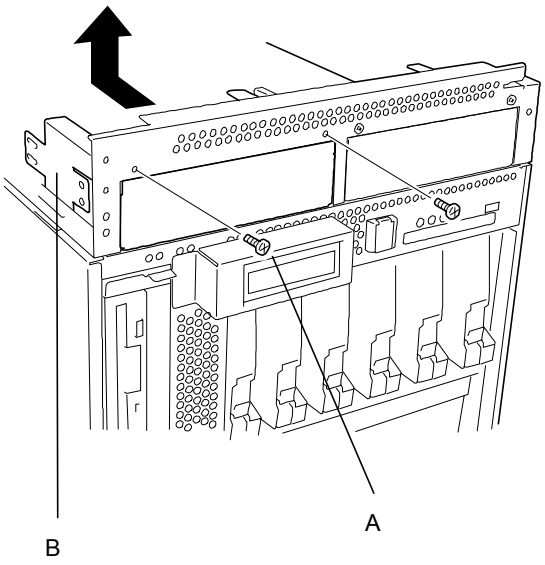
Two tape drives can be connected to one group depending on the connection method. However, to utilize the fault-tolerant feature, we recommend that two identical tape drives be connected to both groups to periodically back up the data between the groups.

Installing a 5.25-inch Tape Drive

Install a 5.25-inch tape drive as follows.

> ***Note:*** All removable media SCSI devices being installed must have their terminators either disabled or removed.

1. To prepare the tower-based unit and tape drive module for installing a tape drive, perform the *Preparation* procedures in subsection *Installing the Internal Device Bay Expansion Kit*.
2. Each empty device bay has a dummy cover and a bracket assembly. From the device bay where you want to install a tape drive, remove the two screws securing the device bay bracket assembly to the tape drive module chassis. See Figure 4-73.
3. Remove the device bay bracket assembly. See Figure 4-73.

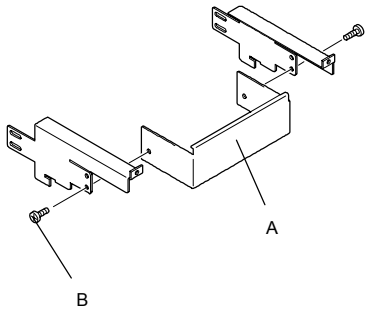


A Screws (2)
B Device bay bracket assembly

Figure 4-73. Removing the Device Bay Bracket Assembly

4. Remove the two screws securing the dummy cover to the device bay bracket assembly. See Figure 4-74.
5. Remove the dummy cover. See Figure 4-74.

> ***Note:*** Save the dummy cover for future use.



A	Dummy Cover
B	Screws (2)

Figure 4-74. Removing the Dummy Cover

6. Remove the tape drive from its protective wrapper and place it on an antistatic surface. Record the drive model and serial number.
7. Set any jumpers or switches in the tape drive. Refer to the installation procedures that come with the tape drive.

> ***Note:*** All tape drives must have their terminators removed.

8. Attach the device bay brackets, which were removed from the dummy cover in step 5 above, to the tape drive. See Figure 4-75.

> ***Note:*** Use the screws supplied with the tape drive. Only use the screws from the device bay brackets when there are no screws provided with the tape drive package.

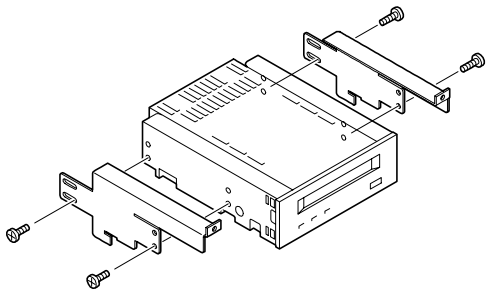
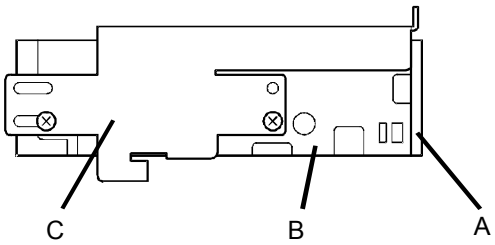


Figure 4-75. Attaching the Device Bay Brackets

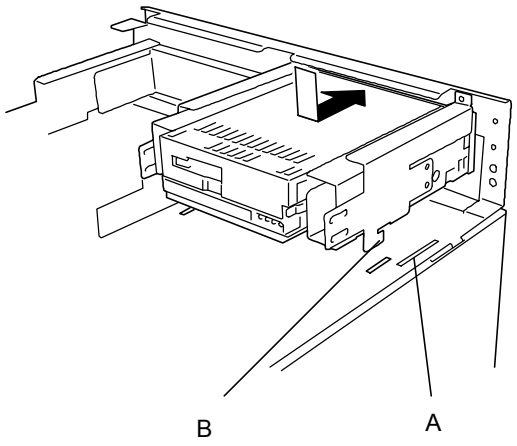
9. Adjust the position of each device bay bracket so that its end is flush with the front face of the tape drive and secure.



A Front face
B Tape Drive
C Bracket

Figure 4-76. Adjusting the Device Bay Bracket

10. Mount the 5.25-inch tape in the device bay by inserting its hooks into their mating slots in the bay and sliding it forward until it is flush with the front panel. See Figure 4-77.



A Oblong slot (one for each side)
B Hook (one on each side)

Figure 4-77. Mounting the 5.25-inch Tape Drive

11. Secure the 5.25-inch device to the device bay with the two screws removed in Step 3 above. See Figure 4-78.

Note: Check to ensure that the front plate of the mounted tape drive is flush with the front panel of the device bay. If a minor adjustment is necessary remove the tape drive and adjust the position of each of its device bay brackets.

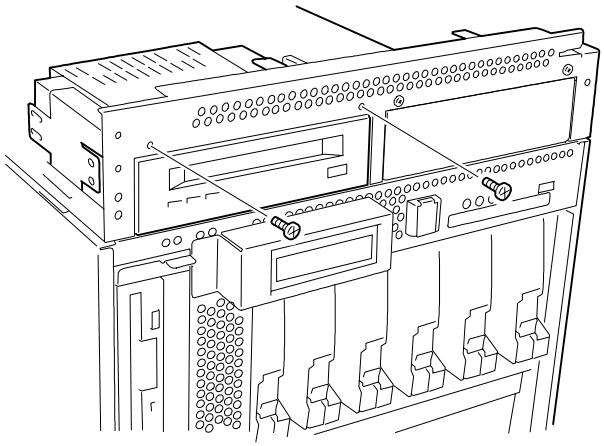


Figure 4-78. Securing the 5.25-inch Tape Drive to the Device Bay

12. Before connecting the SCSI interface cable to the tape drive remove the 50-pin conversion connector plugged into its connector. This conversion connector is only used to connect the 5.25-inch tape drive to another device. See Figure 4-79.

> ***Note:*** Save the 50-pin conversion connector for future use.

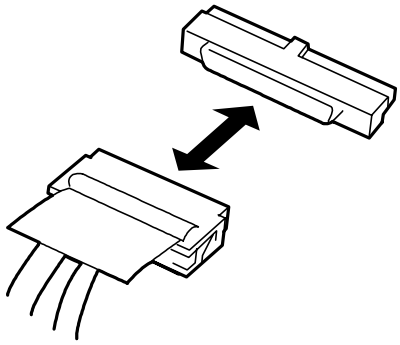
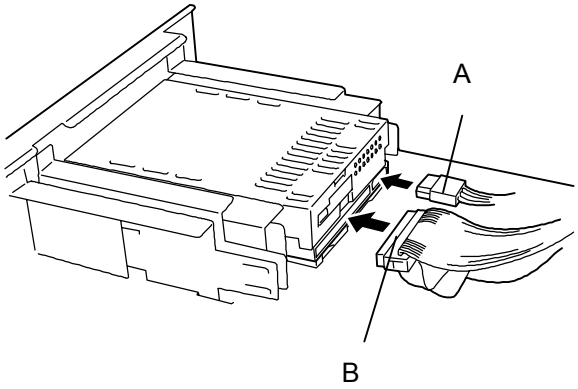


Figure 4-79. Removing the 50-pin Conversion Connector

13. Connect the power cable (A) and interface cable (B) to the 5.25-inch tape drive. The middle connector of the internal SCSI interface cable connects to a 5.25-inch tape drive See Figure 4-80 and Figure 4-81.



A Power cable
B Interface cable (middle connector)

Figure 4-80. Connecting the Power and Interface Cables to a 5.25-inch Tape Drive

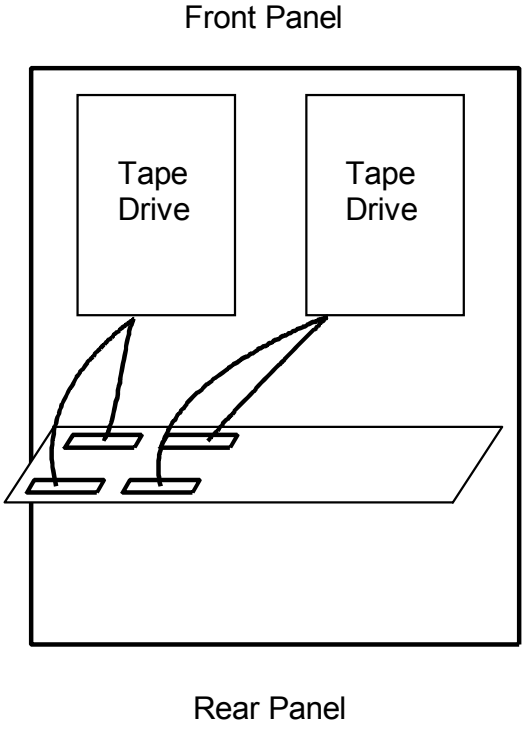


Figure 4-81. Internal Interface Cable Connections - Top View

14. Mount the front door and top cover removed in Step 1 above. **DO NOT** install the two knurled screws that secure the rear cable cover of the top cover to the chassis at this time. See Figure 4-63.

15. Loosen the two screws securing the appropriate rear cable cover external cable restrainer, lift the external cable restrainer, and tighten the screws. Perform the same procedure on the other rear cable cover external cable restrainer if used. See Figure 4-82.

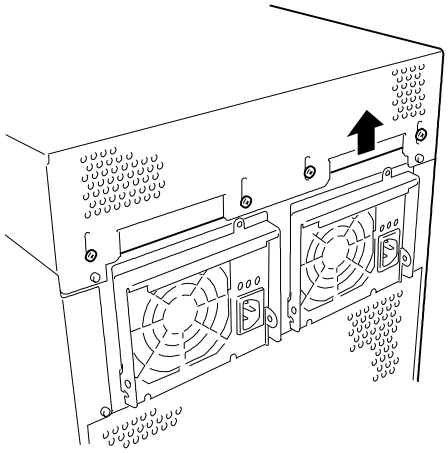


Figure 4-82. Adjusting the Rear Cable Cover External Cable Restrainers

16. Open the rear cable cover of the top cover. See Figure 4-83.

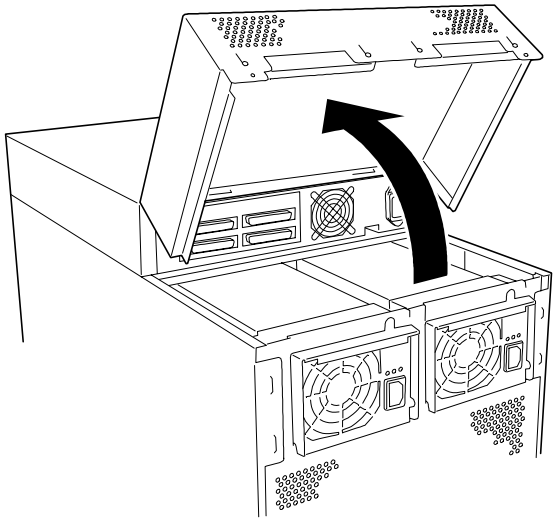
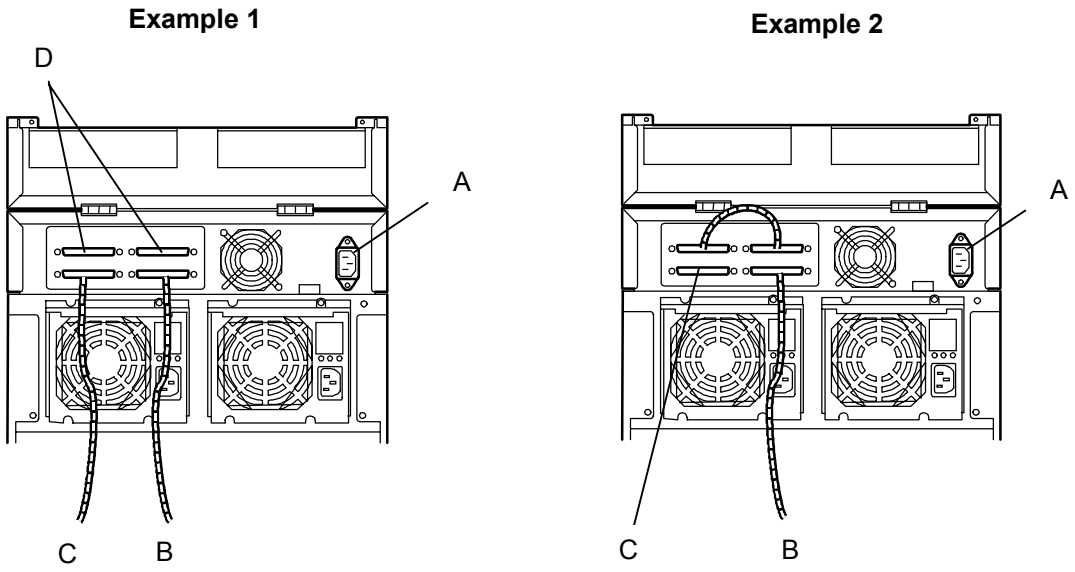


Figure 4-83. Opening the Rear Cable Cover of the Top Cover

17. Connect the external SCSI interface cables and power cords supplied with the internal device bay expansion kit. See Figure 4-84.

The following examples show two different methods of connecting the SCSI interface cables. See Figure 4-84:

- Example 1: Shows the method of connecting two 5.25-inch tape drives to two SCSI controller boards. For this method, connect a SCSI controller board to a 5.25-inch tape drive with an external SCSI interface cable (supplied with the internal device bay expansion kit) for group 1 SCSI cable connectors and group 2 SCSI cable connectors.
- Example 2: Shows the method of connecting two 5.25-inch tape drives to one SCSI controller board in daisy chain fashion. When using this type of connection, you must be careful of the cable length. Check the total length of the SCSI interface cables to ensure that it is 6 meters or less (the cable length inside the device bay is 2 meters, the length from the SCSI board to the device bay is 1.5 meters, and the length between the device bays is 0.3 meters).



A Power cord connector
B External SCSI interface cable
C External SCSI interface cable
D Terminators

A Power cord connector
B External SCSI interface cable
C Terminator

Figure 4-84. External SCSI Interface Cabling Configurations

18. Close the rear cable cover in such a manner that the SCSI interface cables and power cords jut out from the cable restrainers. See Figure 4-85.

> ***Note:*** Route the SCSI interface cables so that they do not block the exhaust port of the cooling fans.

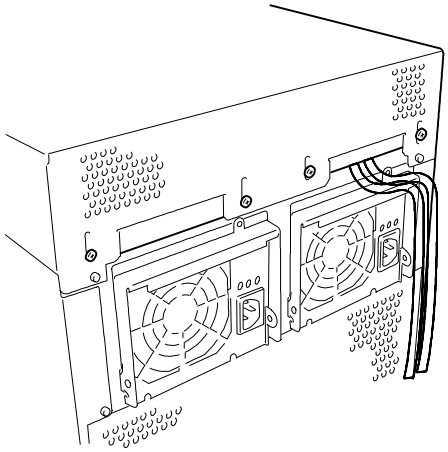


Figure 4-85. Routing the SCSI Interface Cables from the Rear Cable Cover

5

Problem Solving

- Problem Solving
- Static Precautions
- Troubleshooting Checklists
- Diagnostic Procedures
- Specific Problems and Corrective Actions
- Problems with the Network
- PCI Installation Tips
- Error Messages and Beep Codes
- How to Identify BIOS and BMC Revision Levels

Problem Solving

This chapter helps you identify and solve problems that may occur during system installation or while using your system. The first section of this chapter tells you how to reset your system in the event of problems. The next few sections provide troubleshooting checklists and procedural steps that help you isolate specific system problems. The last section includes BIOS, system, and disk status user information.

Fault-tolerant systems require both hardware and software-based methods of troubleshooting system hardware. Hardware-based troubleshooting relies on status LED indicators and error messages either displayed on a monitor or LCD panel. Software-based troubleshooting is achieved by way of the server manager. Information about hardware failures is viewed from various sources:

- Status LEDs on each hardware component
- Alarm messages on the system monitor and LCD panel
- Windows 2000 Event Log
- System inventory from the Server Manager

The failed system component related to an error condition is identified as a Customer Replaceable Unit (CRU) of which most are hot-pluggable and redundant.
See Chapter 1, "Customer Replaceable Units (CRUs).

⚠ WARNING

The DC push-button on/off switch on the front panel does not turn off the system AC power. Also, +5vdc is present on some of the system boards whenever the AC power cord is connected between the system and an AC outlet. Before doing the procedures in this manual, make sure that your system is powered off and unplug the AC power cords from the back of the chassis. Failure to disconnect power before opening your system can result in personal injury and equipment damage

Static Precautions

An electrostatic discharge (ESD) can damage disk drives, option boards, and other components. You can provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground when handling system components.

Electronic devices can be easily damaged by static electricity. To prevent damage, keep them in their protective packaging when they are not installed in your system.

Troubleshooting Checklists

The following subsections provide troubleshooting checklists for problems that occur at initial system startup, when you run new application software, and after the system hardware and software have been running correctly.

Initial System Startup

Incorrect installation or configuration usually causes problems that occur at initial system startup. Hardware failure is a less frequent cause. If you have problems during initial system startup, review the following checklist.

Checklist

- Are the system power cords properly connected to the system and plugged into a NEMA 5-15R outlet (100-120 VAC), a NEMA 6-15R outlet (200-240 VAC), or an UPS that meets the power specifications of the system?
- Is AC power available at the wall outlet?
- Did you press the power on/off push-button switch on the front panel to turn the system on (power on LED should be lit)?
- Are all cables correctly connected and secured?
- Are all jumpers and switch settings on option boards and peripheral devices correct? To check these settings, refer to the manufacturer's documentation that comes with them. If applicable, ensure that there are no conflicts; for example, two option boards sharing the same interrupt.
- Are all switch and jumper settings on internal boards and drives correct?
- Are the CPU modules and I/O modules fully seated in their bays? Refer to subsection *Upgrading Your System* in chapter 4 for installation instructions?
- Are all peripheral devices installed correctly? Refer to subsection *Upgrading Your System* in chapter 4 for installation instructions?
- Are all option boards and disk drives installed correctly? Refer to the *Options Boards* and *Hard Disk Drives* subsections of *Upgrading Your System* chapter 4.
- Is the system hard disk drive properly formatted or configured?
- Is the operating system properly loaded? Refer to the operating system documentation.
- Are all drivers properly installed? For information about installing drivers, refer to your *Network Operating System Configuration Guide*.
- Are the configuration settings in BIOS Setup and the SCSISelcet Utility correct? For information about running these utilities, refer to the *Configuring Your System* chapter 3.

If the above items are all correct, but the problem reoccurs, refer to *Diagnostic Procedures* in this chapter.

Running New Application Software

Problems that occur when you run new application software are usually related to the software. Faulty equipment is much less likely, especially if other software runs correctly. If you have problems while running new application software, check the following checklist.

Checklist

- Does the system meet the minimum hardware requirements for the software? Refer to the software documentation.
- Is the software an authorized copy? If not, obtain an authorized copy of the software. Unauthorized copies often do not work.
- If you are running the software from a diskette, is it a good copy?
- If you are running the software from a hard disk drive, is the software correctly installed? Where all necessary procedures followed and files installed?
- If you are running the software from a CD-ROM disk is the disk scratched or dirty?
- Are the correct device drivers installed?
- Is the software correctly configured for the system?
- Are you using the software correctly?
- If other software runs correctly on the system, contact your vendor about the failing software.

If the problems persist with the software, contact the software vendor's customer service representative.

After System Has Been Running Correctly

Problems that occur after the system hardware and software have been running correctly often indicate equipment failure. However, many situations that are easy to correct can also cause such problems. If you have problems after the system has been running correctly, check the following checklist.

Checklist

- If you are running the software from a diskette or CD-ROM, try a new copy of the software or try a different floppy disk or CD-ROM disk to see if the problem occurs on all the disks.
- If you are running the software from a hard disk drive, try running it from a floppy diskette. If the software runs correctly, there may be a problem with the copy on the hard disk. Reinstall the software on the hard disk drive and try running it again. Make sure all the necessary files are installed.
- If the problem recurs, you may need to reformat the hard disk drive. The hard disk drive, the drive controller, or the system device backplane board set may be defective.
- If the problems are intermittent, there may be a loose cable, dirt in the keyboard (if keyboard input is incorrect), a marginal power supply, or other random component failures.
- If you suspect that a transient voltage spike, power outage, or brownout might have occurred, reload the software and try running it again. Symptoms of voltage spikes include a flickering video display, unexpected system reboots, and the system not responding to user commands.

> ***Note:*** Voltage spikes can corrupt or destroy data files on the drive. If you are experiencing voltage spikes on the power line, install a surge suppresser between the power outlet and the system power cord.

If the problem recurs after you have checked and corrected all of the above items, refer to *Diagnostic Procedures* in this chapter.

Diagnostic Procedures

This section provides a more detailed approach to diagnosing and identifying problems and then locating their sources.

Error Checking

Each time you turn on the system, POST (Power-On-Self-Test) runs automatically and checks all boards, processors, keyboard, and mouse.

If POST finds an error, it displays an error message. Refer to the *Error Message* section in this chapter for an explanation of each error message.

Troubleshooting Guide

Use the following troubleshooting procedures to help you identify a problem. These general procedures lead you through the following:

- Preparing the system for diagnosing problems
- Monitoring POST while it is running
- Verifying proper operation of key system LEDs
- Confirming loading of the operating system.

Preparing the System for Diagnosing Problems

To prepare the system for diagnosing problems, perform the following:

> ***Note:*** Before disconnecting any peripheral cables from the system, turn off the system and any external peripheral devices. Failure to do so can cause permanent damage to the system and/or the peripheral devices.

1. Turn off the system and all external peripheral devices. Disconnect all devices from the system except the keyboard and video monitor.
2. Make sure the system power cords are plugged into a properly grounded AC outlet.
3. Make sure your video display monitor and keyboard are correctly connected to the system. Turn on the video monitor. Set its brightness and contrast controls to at least two-thirds of their maximum ranges (refer to the documentation supplied with your video display monitor).
4. If the operating system normally loads from the hard disk drive, make sure there is no diskette in drive A. Otherwise, place a diskette containing the operating system files in drive A.
5. Turn on the system. If the power indicator LED does not light, refer to *Power Light Does Not Light* found later in this chapter.

Monitoring POST

Each time you turn on the system, the Power-On Self-Test (POST) runs automatically and checks the CPU modules, PCI modules, keyboard, mouse, and most installed peripheral devices.

During the memory test, POST displays the amount of memory that it is able to access and test. Depending on the amount of memory, it may take several minutes to complete the memory test. When the memory test completes, the following is displayed:

Press <F2> to enter SETUP

Press <**F2**> to enter BIOS SETUP. When the utility appears, follow the instructions on your monitor to configure BIOS. See chapter 3, "Configuring Your System." If you do not press <**F2>**, the above message remains for a few seconds, the boot process continues, and the system beeps once. Then this message appears:

Operating System not found

If you do not press <F2>, the boot process continues and this message appears:

Press <Alt Q> to enter Fast!Util™ Utility!

Press <**Alt Q**> if you want to configure SCSI devices in your system. When the utility appears, follow the instructions on your monitor to configure the SCSI host adapter settings and run the SCSI disk utilities. See chapter3, *Configuring Your System*. If you choose not to run Fast!Util ™ Utility, the boot process continues.

After POST completes, the system beeps once.

If POST finds an error, it displays an error message and, in case there is a problem with the display, it emits a series of long and short beeps. Write down any beep code emitted. This information is useful to your service representative.

Refer to the “Error Messages” section in this chapter for a list of items to check for each error code and for an explanation of the error beep codes.

The POST Tests table at the end of this chapter lists keys active during POST and provides a description of errors that may occur.

The BIOS indicates errors by writing an error code to the standard logging area in the Extended BIOS Data Area, and by displaying a message on the screen, which is sometimes preceded by the POST Error Code. The error code will also be logged to the Event Logging area.

Report any error code to your service representative.

POST Keys and Errors

Action/Message	Description
If POST Beeps Before Video Appears	Initialization failed before video initialized. Most beep code errors are fatal; initialization cannot continue. Refer to the section “Error Messages” in this chapter.
If Monitor Displays Error	Note error; press **F1** to continue boot or **F2** to enter Setup. Refer to the section “Error Messages” in this chapter.
To Enter Setup	Setup changes specific options, then writes to CMOS, NVRAM. Press **F2** during initialization to run Setup. If you do not press **F2**, the boot process continues.
Enter BOOT Diskette	If prompted, insert the boot diskette.

Verifying Proper Operation of Key System Indicators

As POST determines the system configuration, it tests for the presence of each mass storage device installed in the system. As each device is checked, its activity indicator should turn on briefly. Check for the following:

- Does the diskette drive activity indicator turn on briefly? If not, refer to “Diskette Drive Activity Indicator Does Not Light” in this chapter.
- If there is a hard disk drive or SCSI devices installed in the system, does the hard disk drive activity indicator turn on briefly? If not, refer to *Hard Disk Drive Activity Indicator Does Not Light* in this chapter.

Confirming Loading of the Operating System

Once the system boots up, the operating system prompt appears on the screen. The prompt varies according to the operating system. If the operating system prompt does not appear, refer to *Problems with Application Software* found later in this chapter.

Specific Problems and Corrective Actions

This section provides possible solutions for the following specific problems:

- Power LED does not light
- No beep or incorrect beep pattern
- No characters appear on screen
- Characters on the screen appear distorted or incorrect
- System cooling fan does not rotate
- Diskette drive activity LED does not light
- Hard disk drive activity LED does not light
- CD-ROM drive activity LED does not light
- Problems with application software
- The startup prompt “Press <F2> key if you want to run Setup” does not appear on the screen.
- The bootable CD-ROM is not detected.

Try the solutions in the order given. If you cannot correct the problem, contact your service representative for assistance.

Power LED Does Not Light

Check the following:

- Are all the power supplies plugged in? Is the power turned on to the AC outlet? Is there a blown fuse or breaker?
- Is the system connected to a 110 or 208 VAC source?
- Is the system operating normally? If so, the power LED is probably defective.
- Are there other problems with the system? If so, check the items listed under System Cooling Fans Do Not Rotate.

Incorrect or No Beep Code

Check the following:

- Is the speaker operating?

If the system operates normally, but there was no beep, the speaker may be defective. If the speaker is enabled, but the speaker does not function, contact your service representative or authorized dealer for assistance..

Record the beep code emitted by POST, and see the “Messages and Beep Codes” section found later in this chapter.

No Characters Appear on Screen

Check the following:

- Is the keyboard working? Check to see if the **Num Lock** light is functioning.
- Is the video display monitor plugged in and turned on? Many modern video monitors shut down when inactive and may require a moment to warm up when activated.
- Are the brightness and contrast controls on the video monitor properly adjusted?
- Are the video monitor switch settings correct?
- Is the video monitor signal cable properly installed?
- Is the video controller installed?

If you are using an add-in video controller board, do the following:

1. Verify that the video controller board is fully seated in its connector in the I/O module (and verify that the video monitor is plugged in to the ACTIVE video controller).
2. Reboot the system for changes to take effect.
3. If there are still no characters on the screen after rebooting the system and POST emits a beep code, write down the beep code you hear. This information is useful for your service representative. See "Post Error Codes and Messages" later in this chapter.
4. POST emits one long beep and two short beeps pattern to indicate a possible problem with the video display controller. If you do not receive a beep code and characters do not appear, the video display monitor or video controller may have failed. You can verify this by trying the monitor on another system or trying a different monitor on this system. Contact your service representative or authorized dealer for assistance.

Characters are Distorted or Incorrect

Check the following:

- Are the brightness and contrast controls properly adjusted on the video display? Refer to the documentation supplied with your video display.
- Are the video monitor's signal and power cables properly installed?
- If the problem persists, the video monitor may be faulty or it may be the incorrect type. Contact your service representative for assistance.

System Cooling Fans Do Not Rotate

If the system cooling fans are not operating properly, system components could be damaged.

> **Note:** In addition to the cooling fans that are an integral part of each power supply, the server has cooling fans. There are no serviceable components inside the power supply. If the power supply is opened, the manufacturer's warranty is voided.

The CPU module has both a rear cooling fan and a front cooling fan. The front cooling fan is mounted at an upward angle in order to cool the hard disk drives. The I/O module only has a rear cooling fan.

Check the following:

- Is AC power available at the wall outlet?
- Are the system power cords properly connected to the power supplies and the AC wall outlets?
- Did you press the power on/off push-button switch?
- Is the power-on light lit?
- Have any of the fan motors stopped (use the server management subsystem to check the fan status)?
- Are the cooling fans power connectors seated properly?
- Is the front panel power on indicator lit?

If the switches and connections are correct and the power outlet is functioning properly, contact your service representative for assistance.

Diskette Drive Activity LED Does Not Light

Check the following:

- Are the diskette drive's power and signal cables properly installed?
- Are all relevant switches and jumpers on the diskette drive set correctly?
- Is the diskette drive properly configured?
- Is the diskette drive activity light always on? If so, the signal cable may be plugged in incorrectly.

Use BIOS Setup to make sure that the diskette drive controller is set to Enabled. For information about running BIOS Setup, refer to the *Configuring Your System* chapter.

If the problem persists, there may be a problem with the diskette drive, device backplane boards, or drive signal cable. Contact your service representative for assistance.

CD-ROM Drive Activity Light Does Not Light

Check the following:

- Is the power and signal cable to the CD-ROM drive properly installed?
- Are all relevant switches and jumpers on the drive set correctly?
- Is the drive properly configured?
- Is the onboard IDE controller enabled?

Problems with Application Software

If you have problems with application software, perform the following:

- Verify that the software is properly configured for the system. Refer to the software installation and operation documentation for instructions on setting up and using the software.
- Verify a different copy of the software to see if the problem is with the copy that you are using.
- Make sure all cables are installed correctly.
- Verify that the PCI board jumpers are set correctly. Refer to the *Configuring Your System* chapter for jumper settings.
- If other software runs correctly on the system, contact your vendor about the failing software.

If the problem persists, contact the software vendor's customer service representative for assistance.

Bootable CD-ROM Is Not Detected

Check the following:

- Is the BIOS set to allow the CD-ROM to be the first bootable device? Check your BIOS Setup (F2) configuration.

Problems with the Network

Diagnostics pass, but the connection fails:

- Make sure the network cable is securely attached.

The controller stopped working when an add-in adapter was installed:

- Make sure the cable is connected to the port from the onboard network controller.
- Make sure the other adapter supports shared interrupts. Also, make sure your operating system supports shared interrupts.
- Try reseating the add-in adapter.

The add-in adapter stopped working without apparent cause.

- Try reseating the adapter first; then try a different slot if necessary.
- The network driver files may be corrupt or deleted. Delete and then reinstall the drivers.
- Run the diagnostics.

PCI Installation Tips

Certain drivers may require interrupts that are not shared with other PCI drivers. The BIOS Setup Utility can be used to adjust the interrupt numbers for PCI devices. For certain drivers, it may be necessary to alter settings so that interrupts are not shared.

Error Messages and Beep Codes

This section describes the LCD error messages, POST error codes and messages, and the POST error beep codes.

LCD Error Messages

If the server system detects an error while operating (power on) or while the power is off, it displays an error message on the LCD panel, see Figure 5-1. The LCD panel provides 16 digits of alphanumeric characters that make up error messages for easy viewing. Table 5-1 lists the *LCD Error Messages*. Included in the error messages are actions for you to remove and replace certain Customer Replaceable Units (CRUs). These actions are numbered to indicate the order in which to perform them. The CRUs associated with the LCD error codes are shown in subsection *LCD Error Code Hardware References* later in this chapter.

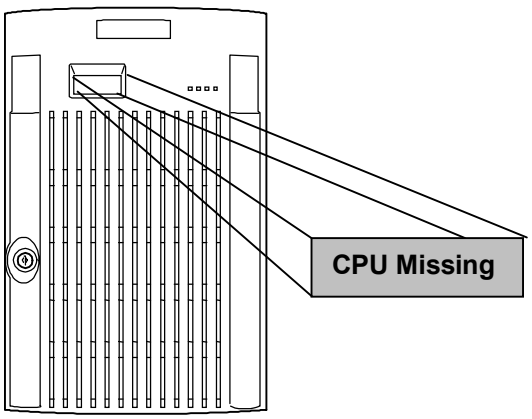


Figure 5-1. Liquid Crystal Display Panel

Table 5-1. LCD Error Messages

Error Message	Status Lamp		Suspected Module	Description	Action
	Color	State			
A					
AC lost Alm 01	Amber	Blink	Power unit #1	Alarm indicating that AC input has not been detected	Check the AC cable. If the same error message is still displayed, contact your service representative.
AC lost Alm 02	Amber	Blink	Power unit #2	Alarm indicating that AC input has not been detected	
AmbientTempAlm00	Amber	Blink	Front panel	Temperature alarm (lower limit)	Contact your service representative.
AmbientTempAlm02	Amber	Lit	Front panel	Fatal temperature alarm (lower limit)	
AmbientTempAlm07	Amber	Blink	Front panel	Temperature alarm (upper limit)	
AmbientTempAlm09	Amber	Lit	Front panel	Fatal temperature alarm (upper limit)	

Table 5-1. LCD Error Messages (continued)

Error Message	Status Lamp		Suspected Module	Description	Action
	Color	State			
B					
BMC Unsync	-	-	PCI module #1	The BMC cannot be synchronized.	Contact your service representative.
BMC1 broken	Green	Blink	PCI module #1	BMC failure	
BMC2 broken	Green	Blink	PCI module #2	BMC failure	
C					
CPU IERR 11	Green	Blink	CPU module #1	CPU#1 internal error	Contact your service representative.
CPU IERR 12	Green	Blink	CPU module #1	CPU#2 internal error	
CPU IERR 21	Green	Blink	CPU module #2	CPU#1 internal error	
CPU IERR 22	Green	Blink	CPU module #2	CPU#2 internal error	
CPU T-Trip 11	Green	Blink	CPU module #1	CPU#1 thermal change error (upper limit)	
CPU T-Trip 12	Green	Blink	CPU module #1	CPU#2 thermal change error (upper limit)	
CPU T-Trip 21	Green	Blink	CPU module #2	CPU#1 thermal change error (upper limit)	
CPU T-Trip 22	Green	Blink	CPU module #2	CPU#2 thermal change error (upper limit)	
CPU1 +12v Alm 00	Amber	Blink	CPU module #1	12-V power voltage alarm (lower limit)	Contact your service representative.
CPU1 +12v Alm 02	Amber	Lit	CPU module #1	Fatal 12-V power voltage alarm (lower limit)	
CPU1 +12v Alm 07	Amber	Blink	CPU module #1	12-V power voltage alarm (upper limit)	
CPU1 +12v Alm 09	Amber	Lit	CPU module #1	Fatal 12-V power voltage alarm (upper limit)	
CPU1 +2.5vAlm 00	Amber	Blink	CPU module #1	2.5-V power voltage alarm (lower limit)	
CPU1 +2.5vAlm 02	Amber	Lit	CPU module #1	Fatal 2.5-V power voltage alarm (lower limit)	
CPU1 +2.5vAlm 07	Amber	Blink	CPU module #1	2.5-V power voltage alarm (upper limit)	
CPU1 +2.5vAlm 09	Amber	Lit	CPU module #1	Fatal 2.5-V power voltage alarm (upper limit)	
CPU1 +3.3vAlm 00	Amber	Blink	CPU module #1	3.3-V power voltage alarm (lower limit)	
CPU1 +3.3vAlm 02	Amber	Lit	CPU module #1	Fatal 3.3-V power voltage alarm (lower limit)	
CPU1 +3.3vAlm 07	Amber	Blink	CPU module #1	3.3-V power voltage alarm (upper limit)	
CPU1 +3.3vAlm 09	Amber	Lit	CPU module #1	Fatal 3.3-V power voltage alarm (upper limit)	
CPU1 +5.0vAlm 00	Amber	Blink	CPU module #1	5-V power voltage alarm (lower limit)	
CPU1 +5.0vAlm 02	Amber	Lit	CPU module #1	Fatal 5-V power voltage alarm (lower limit)	
CPU1 +5.0vAlm 07	Amber	Blink	CPU module #1	5-V power voltage alarm (upper limit)	
CPU1 +5.0vAlm 09	Amber	Lit	CPU module #1	Fatal 5-V power voltage alarm (upper limit)	

Table 5-1. LCD Error Messages (continued)

Error Message	Status Lamp		Suspected Module	Description	Action
	Color	State			
CPU1 +5.0vsAlm00	Amber	Blink	CPU module #1	5-V power voltage alarm (lower limit)	Contact your service representative.
CPU1 +5.0vsAlm02	Amber	Lit	CPU module #1	Fatal 5-V power voltage alarm (lower limit)	
CPU1 +5.0vsAlm07	Amber	Blink	CPU module #1	5-V power voltage alarm (upper limit)	
CPU1 +5.0vsAlm09	Amber	Lit	CPU module #1	Fatal 5-V power voltage alarm (upper limit)	
CPU1 Broken	Green	Blink	CPU module #1	CPU module failure	
CPU1 FAN Alm 01	Amber	Blink	CPU module #1	Cooling fan 1 alarm	Check if the internal fan is clean and if the internal fan cable is connected firmly. If the same error message is still displayed, contact your service representative.
CPU1 FAN Alm 02	Amber	Blink	CPU module #1	Cooling fan 2 alarm	
CPU FANvltAlm00	Amber	Blink	CPU module #1	Voltage alarm (lower limit) of the CPU module cooling fan	Contact your service representative.
CPU FANvltAlm02	Amber	Lit	CPU module #1	Fatal voltage alarm (lower limit) of the CPU module cooling fan	
CPU FANvltAlm07	Amber	Blink	CPU module #1	Voltage alarm (upper limit) of the CPU module cooling fan	
CPU FANvltAlm09	Amber	Lit	CPU module #1	Fatal voltage alarm (upper limit) of the CPU module cooling fan	
CPU1 Missing	Green	Blink	CPU module #1	CPU not found	
CPU1 offline	Green	Blink	CPU module #1	The CPU module has been logically disconnected.	Activate the ft server utility, or remove the module and then mount it again. If the same error message is still displayed, contact your service representative.
CPU1 removed	Green	Blink	CPU module #1	The CPU module has come off.	Check the module for a removed screw, or remove the module and then mount it again. If the same error message is still displayed, contact your service representative.
CPU1 Temp Alm 00	Amber	Blink	CPU module #1	Temperature alarm (lower limit)	Check if the internal fan is clean and if the internal fan cable is connected firmly. If the same error message is still displayed, contact your service representative.
CPU1 Temp Alm 02	Amber	Lit	CPU module #1	Fatal temperature alarm (lower limit)	
CPU1 Temp Alm 07	Amber	Blink	CPU module #1	Temperature alarm (upper limit)	
CPU1 Temp Alm 09	Amber	Lit	CPU module #1	Fatal temperature alarm (upper limit)	
CPU11 TempAlm 00	Amber	Blink	CPU module #1	CPU#1 temperature alarm (lower limit)	
CPU11 TempAlm 02	Amber	Lit	CPU module #1	Fatal CPU#1 temperature alarm (lower limit)	
CPU11 TempAlm 07	Amber	Blink	CPU module #1	CPU#1 temperature alarm (upper limit)	

Table 5-1. LCD Error Messages (continued)

Error Message	Status Lamp		Suspected Module	Description	Action
	Color	State			
CPU11 TempAlm 09	Amber	Lit	CPU module #1	Fatal CPU#1 temperature alarm (upper limit)	Check if the internal fan is clean and if the internal fan cable is connected firmly. If the same error message is still displayed, contact your service representative.
CPU11 VoltAlm 00	Amber	Blink	CPU module #1	CPU#1 operating voltage alarm (lower limit) (VCCP)	Contact your service representative.
CPU11 VoltAlm 02	Amber	Lit	CPU module #1	Fatal CPU#1 operating voltage alarm (lower limit) (VCCP)	
CPU11 VoltAlm 07	Amber	Blink	CPU module #1	CPU#1 operating voltage alarm (upper limit) (VCCP)	
CPU11 VoltAlm 09	Amber	Lit	CPU module #1	Fatal CPU#1 operating voltage alarm (upper limit) (VCCP)	
CPU12 TempAlm 00	Amber	Blink	CPU module #1	CPU#2 operating voltage alarm (lower limit)	Check if the internal fan is clean and if the internal fan cable is connected firmly. If the same error message is still displayed, contact your service representative.
CPU12 TempAlm 02	Amber	Lit	CPU module #1	Fatal CPU#2 temperature alarm (lower limit)	
CPU12 TempAlm 07	Amber	Blink	CPU module #1	CPU#2 temperature alarm (upper limit)	
CPU12 TempAlm 09	Amber	Lit	CPU module #1	Fatal CPU#2 temperature alarm (upper limit)	Check if the internal fan is clean and if the internal fan cable is connected firmly. If the same error message is still displayed, contact your service representative.
CPU12 VoltAlm 00	Amber	Blink	CPU module #1	CPU#2 operating voltage alarm (lower limit) (VCCP)	Contact your service representative.
CPU12 VoltAlm 02	Amber	Lit	CPU module #1	Fatal CPU#2 operating voltage alarm (lower limit) (VCCP)	
CPU12 VoltAlm 07	Amber	Blink	CPU module #1	CPU#2 operating voltage alarm (upper limit) (VCCP)	
CPU12 VoltAlm 09	Amber	Lit	CPU module #1	Fatal CPU#2 operating voltage alarm (upper limit) (VCCP)	
CPU1 FANvltAlm02	Amber	Lit	CPU module #1	Fatal voltage alarm (lower limit) of the CPU module cooling fan	Check if the internal fan is clean and if the internal fan cable is connected firmly. If the same error message is still displayed, contact your service representative.
CPU1 FANvltAlm07	Amber	Blink	CPU module #1	Voltage alarm (upper limit) of the CPU module cooling fan	
CPU1 FANvltAlm09	Amber	Lit	CPU module #1	Fatal voltage alarm (upper limit) of the CPU module cooling fan	
CPU1 Missing	Green	Blink	CPU module #1	CPU not found	Contact your service representative.
CPU1 offline	Green	Blink	CPU module #1	The CPU module has been logically disconnected.	
CPU1 removed	Green	Blink	CPU module #1	The CPU module has come off.	

Table 5-1. LCD Error Messages (continued)

Error Message	Status Lamp		Suspected Module	Description	Action
	Color	State			
CPU2 Temp Alm 00	Amber	Blink	CPU module #2	Temperature alarm (lower limit)	Check if the internal fan is clean and if the internal fan cable is connected firmly. If the same error message is still displayed, contact your service representative.
CPU2 Temp Alm 02	Amber	Lit	CPU module #2	Fatal temperature alarm (lower limit)	
CPU2 Temp Alm 07	Amber	Blink	CPU module #2	Temperature alarm (upper limit)	
CPU2 Temp Alm 09	Amber	Lit	CPU module #2	Fatal temperature alarm (upper limit)	
CPU2 +12v Alm 00	Amber	Blink	CPU module #2	12-V power voltage alarm (lower limit)	Contact your service representative.
CPU2 +12v Alm 02	Amber	Lit	CPU module #2	Fatal 12-V power voltage alarm (lower limit)	
CPU2 +12v Alm 07	Amber	Blink	CPU module #2	12-V power voltage alarm (upper limit)	
CPU2 +12v Alm 09	Amber	Lit	CPU module #2	Fatal 12-V power voltage alarm (upper limit)	
CPU2 +2.5vAlm 00	Amber	Blink	CPU module #2	2.5-V power voltage alarm (lower limit)	Contact your service representative.
CPU2 +2.5vAlm 02	Amber	Lit	CPU module #2	Fatal 2.5-V power voltage alarm (lower limit)	
CPU2 +2.5vAlm 07	Amber	Blink	CPU module #2	2.5-V power voltage alarm (upper limit)	
CPU2 +2.5vAlm 09	Amber	Lit	CPU module #2	Fatal 2.5-V power voltage alarm (upper limit)	
CPU2 +3.3vAlm 00	Amber	Blink	CPU module #2	3.3-V power voltage alarm (lower limit)	
CPU2 +3.3vAlm 02	Amber	Lit	CPU module #2	Fatal 3.3-V power voltage alarm (lower limit)	
CPU2 +3.3vAlm 07	Amber	Blink	CPU module #2	3.3-V power voltage alarm (upper limit)	
CPU2 +3.3vAlm 09	Amber	Lit	CPU module #2	Fatal 3.3-V power voltage alarm (upper limit)	
CPU2 +5.0vAlm 00	Amber	Blink	CPU module #2	5-V power voltage alarm (lower limit)	
CPU2 +5.0vAlm 02	Amber	Lit	CPU module #2	Fatal 5-V power voltage alarm (lower limit)	
CPU2 +5.0vAlm 07	Amber	Blink	CPU module #2	5-V power voltage alarm (upper limit)	
CPU2 +5.0vAlm 09	Amber	Lit	CPU module #2	Fatal 5-V power voltage alarm (upper limit)	
CPU2 +5.0vsAlm00	Amber	Blink	CPU module #2	5-V power voltage alarm (lower limit)	
CPU2 +5.0vsAlm02	Amber	Lit	CPU module #2	Fatal 5-V power voltage alarm (lower limit)	
CPU2 +5.0vsAlm07	Amber	Blink	CPU module #2	5-V power voltage alarm (upper limit)	
CPU2 +5.0vsAlm09	Amber	Lit	CPU module #2	Fatal 5-V power voltage alarm (upper limit)	
CPU2 broken	Green	Blink	CPU module #2	CPU module failure	
CPU2 FAN Alm 01	Amber	Blink	CPU module #2	Cooling fan 1 alarm	Check if the internal fan is clean and if the internal fan cable is connected firmly. If the same error message is still displayed, contact your service representative.
CPU2 FAN Alm 02	Amber	Blink	CPU module #2	Cooling fan 2 alarm	

Table 5-2. LCD Error Messages (continued)

Error Message	Status Lamp		Suspected Module	Description	Action
	Color	State			
CPU2 FANvltAlm00	Amber	Blink	CPU module #2	Voltage alarm (lower limit) of the CPU module cooling fan	Contact your service representative.
CPU2 FANvltAlm02	Amber	Lit	CPU module #2	Fatal voltage alarm (lower limit) of the CPU module cooling fan	
CPU2 FANvltAlm07	Amber	Blink	CPU module #2	Voltage alarm (upper limit) of the CPU module cooling fan	
CPU2 FANvltAlm09	Amber	Lit	CPU module #2	Fatal voltage alarm (upper limit) of the CPU module cooling fan	
CPU2 Missing	Green	Blink	CPU module #2	CPU not found	
CPU2 offline	Green	Blink	CPU module #2	The CPU module has been logically disconnected.	Activate the ft server utility, or remove the module and then mount it again. If the same error message is still displayed, contact your service representative.
CPU2 removed	Green	Blink	CPU module #2	The CPU module has come off.	Check the module for a removed screw, or remove the module and then mount it again. If the same error message is still displayed, contact your service representative.
CPU2 Temp Alm 00	Amber	Blink	CPU module #2	Temperature alarm (lower limit)	Check if the internal fan is clean and if the internal fan cable is connected firmly. If the same error message is still displayed, contact your service representative.
CPU21 VoltAlm 00	Amber	Blink	CPU module #2	CPU#1 operating voltage alarm (lower limit) (VCCP)	Contact your service representative.
CPU21 VoltAlm 02	Amber	Lit	CPU module #2	Fatal CPU#1 operating voltage alarm (lower limit) (VCCP)	
CPU21 VoltAlm 07	Amber	Blink	CPU module #2	CPU#1 operating voltage alarm (upper limit) (VCCP)	
CPU21 VoltAlm 09	Amber	Lit	CPU module #2	Fatal CPU#1 operating voltage alarm (upper limit) (VCCP)	
CPU21 TempAlm 00	Amber	Blink	CPU module #2	CPU#1 temperature alarm (lower limit)	Check if the internal fan is clean and if the internal fan cable is connected firmly. If the same error message is still displayed, contact your service representative.
CPU21 TempAlm 02	Amber	Lit	CPU module #2	Fatal CPU#1 temperature alarm (lower limit)	
CPU21 TempAlm 07	Amber	Blink	CPU module #2	CPU#1 temperature alarm (upper limit)	
CPU21 TempAlm 09	Amber	Lit	CPU module #2	Fatal CPU#1 temperature alarm (upper limit)	

Table 5-1. LCD Error Messages (continued)

Error Message	Status Lamp		Suspected Module	Description	Action
	Color	State			
CPU22 TempAlm 00	Amber	Blink	CPU module #2	CPU#2 temperature alarm (lower limit)	Check if the internal fan is clean and if the internal fan cable is connected firmly. If the same error message is still displayed, contact your service representative.
CPU22 TempAlm 02	Amber	Lit	CPU module #2	Fatal CPU#2 temperature alarm (lower limit)	
CPU22 TempAlm 07	Amber	Blink	CPU module #2	CPU#2 temperature alarm (upper limit)	
CPU22 TempAlm 09	Amber	Lit	CPU module #2	Fatal CPU#2 temperature alarm (upper limit)	
CPU22 VoltAlm 00	Amber	Blink	CPU module #2	CPU#2 operating voltage alarm (lower limit) (VCCP)	Contact your service representative.
CPU22 VoltAlm 02	Amber	Lit	CPU module #2	Fatal CPU#2 operating voltage alarm (lower limit) (VCCP)	
CPU22 VoltAlm 07	Amber	Blink	CPU module #2	CPU#2 operating voltage alarm (upper limit) (VCCP)	
CPU22 VoltAlm 09	Amber	Lit	CPU module #2	Fatal CPU#2 operating voltage alarm (upper limit) (VCCP)	
D					
DUMP Request!	Off		-	DUMP switch request	Contact your service representative.
F					
FRB Processing	Off		-	During POST execution or OS start processing	The server is operating normally.
M					
Memory U-Err 11	Green	Blink	CPU module #1	DIMM#1 2-bit error	The DIMM needs to be replaced. Contact your service representative.
Memory U-Err 12	Green	Blink	CPU module #1	DIMM#2 2-bit error	
Memory U-Err 13	Green	Blink	CPU module #1	DIMM#3 2-bit error	
Memory U-Err 14	Green	Blink	CPU module #1	DIMM#4 2-bit error	
Memory U-Err 21	Green	Blink	CPU module #2	DIMM#1 2-bit error	
Memory U-Err 22	Green	Blink	CPU module #2	DIMM#2 2-bit error	
Memory U-Err 23	Green	Blink	CPU module #2	DIMM#3 2-bit error	
Memory U-Err 24	Green	Blink	CPU module #2	DIMM#4 2-bit error	
O					
OS shutdown Alm	Off		-	Shutdown due to a timeout error of the Watch dog timer (fatal error)	Contact your service representative.
P					
PCI1 +12v Alm 00	Amber	Blink	PCI module #1	12-V power voltage alarm (lower limit)	Contact your service representative.
PCI1 +12v Alm 02	Amber	Lit	PCI module #1	Fatal 12-V power voltage alarm (lower limit)	
PCI1 +12v Alm 07	Amber	Blink	PCI module #1	12-V power voltage alarm (upper limit)	
PCI1 +12v Alm 09	Amber	Lit	PCI module #1	Fatal 12-V power voltage alarm (upper limit)	

Table 5-1. LCD Error Messages (continued)

Error Message	Status Lamp		Suspected Module	Description	Action
	Color	State			
PCI1 +3.3vAlm 00	Amber	Blink	PCI module #1	3.3-V power voltage alarm (lower limit)	Contact your service representative.
PCI1 +3.3vAlm 02	Amber	Lit	PCI module #1	Fatal 3.3-V power voltage alarm (lower limit)	
PCI1 +3.3vAlm 07	Amber	Blink	PCI module #1	3.3-V power voltage alarm (upper limit)	
PCI1 +3.3vAlm 09	Amber	Lit	PCI module #1	Fatal 3.3-V power voltage alarm (upper limit)	
PCI1 +3.3vsAlm00	Amber	Blink	PCI module #1	3.3-V power voltage alarm (lower limit)	
PCI1 +3.3vsAlm02	Amber	Lit	PCI module #1	Fatal 3.3-V power voltage alarm (lower limit)	
PCI1 +3.3vsAlm07	Amber	Blink	PCI module #1	3.3-V power voltage alarm (upper limit)	
PCI1 +3.3vsAlm09	Amber	Lit	PCI module #1	Fatal 3.3-V power voltage alarm (upper limit)	
PCI1 +5vAlm 00	Amber	Blink	PCI module #1	5-V power voltage alarm (lower limit)	
PCI1 +5vAlm 02	Amber	Lit	PCI module #1	Fatal 5-V power voltage alarm (lower limit)	
PCI1 +5vAlm 07	Amber	Blink	PCI module #1	5-V power voltage alarm (upper limit)	
PCI1 +5vAlm 09	Amber	Lit	PCI module #1	Fatal 5-V power voltage alarm (upper limit)	
PCI1 Bus PERR 01	Green	Blink	PCI module #1	PCI bus parity error	
PCI1 Bus SERR 01	Green	Blink	PCI module #1	PCI but 1-bit error	Contact your service representative.
PCI1 FAN Alm 01	Amber	Blink	PCI module #1	Cooling fan alarm	Check if the internal fan is clean and if the internal fan cable is connected firmly. If the same error message is still displayed, contact your service representative.
PCI1 offline	Green	Blink	PCI module #1	The PCI module has been logically disconnected.	Activate the ft server utility, or remove the module and then mount it again. If the same error message is still displayed, contact your service representative.
PCI1 removed	Green	Blink	PCI module #1	The PCI module has come off.	Check the module for a removed screw, or remove the module and then mount it again. If the same error message is still displayed, contact your service representative.

Table 5-1. LCD Error Messages (continued)

Error Message	Status Lamp		Suspected Module	Description	Action
	Color	State			
PCI1 Temp Alm 00	Amber	Blink	PCI module #1	Temperature alarm (lower limit)	Check if the internal fan is clean and if the internal fan cable is connected firmly. If the same error message is still displayed, contact your service representative.
PCI1 Temp Alm 02	Amber	Lit	PCI module #1	Fatal temperature alarm (lower limit)	
PCI1 Temp Alm 07	Amber	Blink	PCI module #1	Temperature alarm (upper limit)	
PCI1 Temp Alm 09	Amber	Lit	PCI module #1	Fatal temperature alarm (upper limit)	
PCI2 +12v Alm 00	Amber	Blink	PCI module #2	12-V power voltage alarm (lower limit)	Contact your service representative.
PCI2 +12v Alm 02	Amber	Lit	PCI module #2	Fatal 12-V power voltage alarm (lower limit)	
PCI2 +12v Alm 07	Amber	Blink	PCI module #2	12-V power voltage alarm (upper limit)	
PCI2 +12v Alm 09	Amber	Lit	PCI module #2	Fatal 12-V power voltage alarm (upper limit)	
PCI2 +3.3vAlm 00	Amber	Blink	PCI module #2	3.3-V power voltage alarm (lower limit)	
PCI2 +3.3vAlm 02	Amber	Lit	PCI module #2	Fatal 3.3-V power voltage alarm (lower limit)	
PCI2 +3.3vAlm 07	Amber	Blink	PCI module #2	3.3-V power voltage alarm (upper limit)	
PCI2 +3.3vAlm 09	Amber	Lit	PCI module #2	Fatal 3.3-V power voltage alarm (upper limit)	
PCI2 +3.3vsAlm00	Amber	Blink	PCI module #2	3.3-V power voltage alarm (lower limit)	
PCI2 +3.3vsAlm02	Amber	Lit	PCI module #2	Fatal 3.3-V power voltage alarm (lower limit)	
PCI2 +3.3vsAlm07	Amber	Blink	PCI module #2	3.3-V power voltage alarm (upper limit)	
PCI2 +3.3vsAlm09	Amber	Lit	PCI module #2	Fatal 3.3-V power voltage alarm (upper limit)	
PCI2 +5.0vAlm 00	Amber	Blink	PCI module #2	5-V power voltage alarm (lower limit)	
PCI2 +5.0vAlm 02	Amber	Lit	PCI module #2	Fatal 5-V power voltage alarm (lower limit)	
PCI2 +5.0vAlm 07	Amber	Blink	PCI module #2	5-V power voltage alarm (upper limit)	
PCI2 +5.0vAlm 09	Amber	Lit	PCI module #2	Fatal 5-V power voltage alarm (upper limit)	
PCI2 Temp Alm 00	Amber	Blink	PCI module #2	Temperature alarm (lower limit)	Check if the internal fan is clean and if the internal fan cable is connected firmly. If the same error message is still displayed, contact your service representative.
PCI2 Temp Alm 02	Amber	Lit	PCI module #2	Fatal temperature alarm (lower limit)	
PCI2 Temp Alm 07	Amber	Blink	PCI module #2	Temperature alarm (upper limit)	
PCI2 Temp Alm 09	Amber	Lit	PCI module #2	Fatal temperature alarm (upper limit)	
Power Major Alm	Amber	Lit	Power unit #1/2	Fatal power (major) alarm	Contact your service representative.
Power On Cnt Alm	Amber	Lit	Power unit #1/2	Fatal power control system failure	Check the AC cable. If the same error message is still displayed, contact your service representative.

Table 5-1. LCD Error Messages (continued)

Error Message	Status Lamp		Suspected Module	Description	Action
	Color	State			
Power Unit Alm01	Amber	Blink	Power unit #1	Power supply unit failure	Contact your service representative.
Power Unit Alm02	Amber	Blink	Power unit #2	Power supply unit failure	
PredictiveAlm 01	Amber	Blink	Power unit #1	Power supply unit alarm	
PredictiveAlm 02	Amber	Blink	Power unit #2	Power supply unit alarm	
S					
SSR Processing	Off		-	Reboot processing for recovery	DUMP is being collected.
Stand-by	Off		-	DC OFF	
W					
WDT timeout	Off		-	Timeout error of the watch dog timer (fatal error)	Contact your service representative.

POST Error Codes and Messages

Whenever a recoverable error occurs during POST, BIOS displays a message on the video display screen and codes (hexadecimal values) in the LCD display to indicate both status and error conditions and causes the speaker to beep as the message appears. BIOS also issues a beep code (one long tone followed by two short tones) during POST if the video configuration fails or if an external ROM module does not a checksum of zero. The BIOS indicates errors by writing an error code to the standard logging area in the Extended BIOS Data Area, and by displaying a message on the screen, which is sometimes preceded by the POST Error Code. The error code is also logged to the Event Logging area.

Recommended actions are specified for each error condition and some will prompt you to remove and replace CRUs. Refer to Chapter 4 "Customer Replaceable Units (CRUs)" and "System Components and Module Set" for the CRUs associated with the error codes displayed.

Table 5-3 *POST Error Codes and Messages* is a list of the error codes and messages written at the start of each POST test. Table 5-4 *POST Error Beep Codes* is a list of beep codes issued for each POST test.

Table 5-3. POST Error Codes and Messages

Error Code and Message		Description	Action
0200	Failure Fixed Disk	• Configuration error in Setup menu. • Hard disk is faulty. • CPU module board is faulty. • PCI module board is faulty.	• Check configuration in Setup menu. • Replace the hard disk. • Replace the CPU module board. • Replace the PCI module board.
0210	Stuck Key	Keyboard connection error.	• Disconnect and reconnect the keyboard. • Replace the keyboard. • Replace the PCI module board.
0211	Keyboard Error	Keyboard is faulty.	• Check the keyboard connection. • Restart the server. • Replace the PCI module board.
0212	Keyboard Controller Failed	Keyboard controller is faulty.	
0213	Keyboard Locked - Unlock Key Switch	Keyboard is locked.	• Unlock the key switch.
0220	Monitor type does not match CMOS - Run SETUP	Illegal monitor type is specified.	• Select "Get Default Value" from the Setup menu. • Clear the CMOS data.

Table 5-3. POST Error Codes and Messages (continued)

Error Code and Message		Description	Action
0230	System RAM Failed at offset	DIMM is faulty.	• Replace DIMM. • Replace the CPU module board.
0231	Shadow RAM Failed at offset	DIMM is faulty.	• Replace DIMM. • Replace the CPU module board.
0232	Extend RAM Failed at address line	DIMM is faulty.	• Replace DIMM. • Replace the CPU module board.
0233	Memory type mixing detected	DIMMs of the different types are installed.	• Replace DIMM with appropriate one.
0234	Single - bit ECC error	DIMM is faulty.	• Replace DIMM. • Replace the CPU module board.
0235	Multiple - bit ECC error	DIMM is faulty.	• Replace DIMM. • Replace the CPU module board.
0250	System Battery is Dead - Replace and Run SETUP	No battery is available for the system.	• Replace the CPU module board.
0251	System CMOS Checksum Bad - Default Configuration Used	NvRAM is faulty.	• Re-configure using the Setup menu. • Replace the PCI module board.
0252	Password checksum bad - Password cleared	NvRAM is faulty.	• Re-set the password in the Setup menu. • Replace the PCI module board.
0260	System Timer Error	CPU module board is faulty.	• Replace the CPU module board.
0270	Real Time Clock Error	Real-time clock error	• Replace the CPU module board.
0271	Check date and time setting	Real-time clock is set incorrectly.	• Set the correct date and time in Setup menu. • Replace the PCI module board.
0280	Previous boot incomplete - Default configuration used	Configuration error in Setup menu.	• Check configuration in Setup menu.
02B0	Diskette drive A error	Floppy drive A is faulty.	• Replace the floppy disk drive A.
02B2	Incorrect Drive A type - run SETUP	Configuration error in Setup menu.	Specify the correct drive type in Setup menu.
02D0	System cache error - Cache disabled	• CPU is faulty. • CPU module board is faulty.	• Replace the CPU. • Replace the CPU module board.
0B1B	PCI System Error on Bus/Device/Function	PCI device is faulty.	• Replace the PCI device board.
0B1C	PCI Parity Error on Bus/Device/Function	PCI device is faulty.	• Re-install the PCI device board. • Re-configure the PCI board.

Table 5-3. POST Error Codes and Messages (continued)

Error Code and Message		Description	Action
0B22	CPUs are installed out of order	CPU is faulty.	• Replace the CPU.
0B24	DIMMs are installed out of order	DIMM is faulty.	• Replace the DIMM.
0B26	Invalid MAC Address detected	FRB2 Timeout error occurred at SetMAC, and rewriting of MAC address failed.	• Replace the front panel board.
0B28	Unsupported Processor detected on Processor 1	The processor (CPU) not supported by this server is installed in Processor 1.	• Install the CPU appropriate to the server.
0B29	Unsupported Processor detected on Processor 2	The processor (CPU) not supported by this server is installed in Processor 2.	• Install the CPU appropriate to the server.
0B30	CPU FAN #1 Alarm occurred	• Dust obstructing the fan. • Fan is faulty. • CPU module board is faulty.	• Replace the fan. • Replace the CPU module board. • Connect fan cable properly.
0B31	CPU FAN #2 Alarm occurred		
0B32	CPU FAN #3 Alarm occurred	• Dust obstructing the fan. • Fan is faulty. • PCI module board is faulty.	• Replace the fan. • Replace the PCI module board. • Connect fan cable properly.
0B47	Missing date and time synchronization	The date and time are incorrect due to a communication error between BMCs.	• Restart the system. • Re-set the date and time in SETUP. • If the error persists, replace the PCI module board.
0B70	The error occurred during temperature sensor reading	• SMBus device is faulty. • SMBus is faulty.	• Replace the CPU/PCI module or front panel board.
0B71	System temperature out of Range	• Fan is faulty. • CPU/PCI module board is faulty.	• Clean the fan. • Replace the fan. • Replace the PCI module board.
0B80	BMC Memory Test Failed	BMC is faulty.	• Replace the PCI module board.
0B81	BMC Firmware Code Area CRC check failed		
0B82	BMC core Hardware failure		
0B83	BMC IBF or OBF check failed		
0B84	BMC issued Reset Command, but failed System Reset	BMC Reset command is disabled and failed to reset the system.	• Replace the PCI module board.
0B90	BMC Platform Information Area corrupted	BMC is faulty.	• Replace the PCI module board.
0B91	BMC update firmware corrupted		
0B92	Internal Use Area of BMC FRU corrupted	• SROM is faulty. • BMC is faulty.	

Table 5-3. POST Error Codes and Messages (continued)

Error Code and Message		Description	Action
0B93	BMC SDR Repository empty	BMC is faulty.	• Replace the PCI module board.
0B94	IPMB signal lines do not respond		
0B95	BMC FRU device failure		
0B96	BMC SDR Repository failure		
0B97	BMC SEL device failure		
0B98	BMC SEL Overflow	SEL (System Event Log) overflowed.	• Clear the SEL.
0BB0	SMBIOS - SROM data read error	• SROM is faulty. • Front panel board is faulty.	• Replace the front panel board.
0BB1	SMBIOS - SROM data checksum bad		
0BD0	1st SMBus device address not acknowledged	Board is faulty.	• Check cable connection. • Replace the board.
0BD1	1st SMBus device Errror detected		
0BD2	1st SMBus timeout		
0BD3	2nd SMBus device address not acknowledged		
0BD4	2nd SMBus device Errror detected		
0BD5	2nd SMBus timeout		
0BD6	3rd SMBus device address not acknowledged		
0BD7	3rd SMBus device Errror detected		
0BD8	3rd SMBus timeout		
0BE2	7th SMBus device address not acknowledged		
0BE3	7th SMBus device Errror detected		
0BE4	7th SMBus timeout		
0BE5	8th SMBus device address not acknowledged		
0BE6	8th SMBus device Errror detected		
0BE7	8th SMBus timeout		

Table 5-3. POST Error Codes and Messages (continued)

Error Code and Message		Description	Action
0C00	Rompilot reports error number xx	• Configuration error in SETUP. • CPU/PCI module board is faulty.	• Re-configure Rompilot. • Replace the CPU/PCI module board.
Expansion ROM not initialized		Configuration error in Setup menu.	• Disable the ROM Expansion for unnecessary options.
Invalid System Configuration Data		• Configuration error in Setup menu. • CPU/PCI module board is faulty.	• Specify "Yes" for Reset Configuration Data to clear the configuration. • Replace the CPU/PCI module board.
NOTICE: Your System Redundant Power Supply is not configured		• SMBus device is faulty. • SMBus is faulty.	• Check cable connection. • Replace the cable. • Replace the CPU/PCI module board.
Resource Conflict		Configuration error in Setup menu.	• Re-configure the device configuration using SETUP.
System Configuration Data Read error		• Configuration error in Setup menu. • CPU/PCI module board is faulty.	• Specify "Yes" for Reset Configuration Data to clear the configuration. • Replace the CPU/PCI module board.
System Configuration Data Write error			
Warning: IRQ not configured		Configuration error in Setup menu.	• Reconfigure using SETUP.

Table 5-4. Post Error Beep Codes

Beeps	Error	Recommended Action
1-2-2-3	ROM Checksum Error	Contact your service representative to replace the CPU module.
1-1-2-4	ROMEXEC Code Error	Check if DIMM board is installed correctly. If the error persists, contact your service representative to replace the DIMM or CPU module board.
1-3-1-1	DRAM Refresh Test Error	
1-3-1-3	Keyboard Controller Error	Disconnect and reconnect the keyboard. If the same error persists, call your service representative to replace the CPU module.
1-3-3-1	Failed to Detect Memory or Incorrect DIMM Type	Check if DIMM boards are installed correctly. If the same error persists, call your service representative to replace the DIMM or CPU module board.
1-3-3-2	Initial Setting error of the POST Memory Manager	
1-3-4-1	RAM Address Error	
1-3-4-3	RAM Low Byte Data Error	
1-4-1-1	RAM High Byte Data Error	
1-4-3-3	Cache Detection Error	Turn unit off and then on. If the same error persists, call your service representative to replace the CPU module board.
2-2-3-1	Illegal Interrupt Test Error	
2-1-2-3	Copyright Check Error	
1-2	Video BIOS Initialization Error	If nothing is displayed on the monitor, check if the main board is installed correctly. If the same error persists, call your service representative to replace the CPU module.
	Option ROM Initialization Error	If the Option ROM on an added PCI board is not displayed on the monitor, check if the PCI board is installed correctly. If the same error persists, call your service representative to replace the CPU module board, PCI module board or added PCI board.
	Option ROM Expansion Error	

How to Identify BIOS and BMC Revision Levels

To help you identify your system's current BIOS and BMC revision levels, refer to the following subsections.

BIOS Revision Level Identification

During system Power-On Self Test (POST), which runs automatically when your system is powered on, your system monitor displays several messages, one of which identifies the BIOS revision level currently loaded on your system, see the example below.

Example: BIOS Revision Level

```
Phoenix BIOS 4.0 Release 6.0.250A
```

In the example above, BIOS 6.0.250A is the current BIOS revision level loaded on your system.

> ***Note:*** The BIOS Revision Level stated in the example may not reflect the actual BIOS setting in your system.

BMC Revision Level Identification

During system Power-On Self Test (POST), which runs automatically when your system is powered on, system diagnostics are run. Following the memory test diagnostic, several messages will appear informing you that the mouse was detected and system configuration data updated, when you see these messages the BMC messages are displayed next.

> ***Note:*** In order to see the diagnostic messages, the ESC key must be pressed.

To identify your system's current BMC revision level, see the example below.

Example: BMC Messages

```
Base Board Management Controller

Copyright (c) 1999 NEC Corporation, all rights reserved.

Device ID       :01     Device Revision     :00
IPMI Version    :1.0    Firmware Revision   :00.60
Self Test Result    :
```

In the example above, Firmware Revision 00.60 is the current BMC revision level loaded on your system.

> ***Note:*** The Firmware Revision Level stated in the example may not reflect the actual BMC revision level setting in your system.

A

Technical Specifications

- Server Unit

This appendix provides the technical specifications for your server unit.

Server Unit

Table A-1 lists the server unit technical specifications.

Table A-1. Server Unit Technical Specifications

Item	Specification
Chassis	
Dimensions	Tower-Based System: Width: 14.0 inches (350 mm) Height: 21.0 inches (525 mm) Depth: 27.8 inches (694 mm) Rack-Mount System: Width: 19.3 inches (483 mm) Height: 14.0 inches (350 mm) Depth: 27.8 inches (694 mm)
Weight	Maximum 114 lbs. (52 kg)
Enclosure	Tower or 19-inch rack mountable (8U)
Environment	Temperature: 50° to 95°F (10° to 35°C) Internal rack ambient temperature should not exceed 25°C Relative humidity: 20% to 80% (no condensation)
Peripheral Interface (rear access)	Two USB (4-pin) port connectors for keyboard and mouse Two serial (9-pin) port connectors SVGA (15-pin) port connector
Peripheral interface (front access)	RJ-45 T/10Base-T/100Base Ethernet port connector
Option PCI Slots per I/O Module	Four 32-bit/33 MHz PCI bus slots (Slot 1 is reserved for graphics card or SMM card)
Storage Device Capacity	One IDE 24X CD-ROM drive One 3 1/2-inch IDE high-capacity (120 MB) super (floppy) disk drive One standard SCSI hard disk drive bay for mounting up to six hot-pluggable 3 1/2-inch SCSI hard disk drives (two logical groups of three disks)
CPU Module	
Processor (up to two per module)	Intel® Pentium® III Processor Clock rate: 800 MHz Cache: 256 KB
Optional Processor Support	Upgradeable from one to two processors

Table A-1. Server Unit Technical Specifications (Continued)

Item	Specification
Chipset	Server Works Server Set III LE
Graphics (VRAM)	Intel® CT69000 (4 MB VRAM)
Fast Ethernet PCI Bus Controller per I/O Module	Intel 82559 10BASE-T/100BASE-TX network controller
SCSI Controller	Embedded Adaptec QLogic ISP12160A dual function controller
Real-Time Clock/Battery	Lithium battery (vendor part no. CR2032)
Peripheral Controller	PC97317 (Super I/O) integrated peripheral controller
Baseboard Management Controller (BMC)	QLogic Zircon BMC
Memory	Up to 2 GB of ECC SDRAM DIMM memory.
Keyboard	USB-compatibe 104-key 12 function keys separate numeric and cursor pads
Mouse	USB serial mouse 2-button
Power Supply	Two 450 Watt power supplies
System Power	AC input: 100 - 120VAC or 200 - 240VAC, 50/60 Hz Power consumption: 750 VA at 450 Watts

B

ROMPilot™ BIOS Error Codes

- ROMPilot™ BIOS Error Codes

ROMPilot™ BIOS Error Codes

This appendix provides the ROMPilot error codes reported to the BIOS and where possible displayed on the screen. Use these values for reference when diagnosing situations where the ROMPilot installation fails.

Table B-1 lists the ROMPilot BIOS Error Codes.

Table B-1. ROMPilot BIOS Error Codes

Error Codes	Error Messages
Error Codes from Real-Mode Kernel Initialization	
00	Unable to find Phoenix Dispatch Manager/Post Memory Manager entry points.
01	Failed to allocate real-mode memory.
02	Failed to load protected-mode kernel module.
03	Failed to load bundle/module (bundle/module is probably corrupt).
04	Protected-mode module is missing kernel signature.
Error Codes from Protected-Mode Kernel Initialization	
05	Failed to initialize memory manager/system objects.
06	Failed to initialize kernel interrupt tables.
07	Failed to allocate descriptor table usage list.
08	Failed to create event object for BIOS messages.
09	Failed to create objects for BIOS slice.
0A	Failed to load all modules (module is probably corrupt).
0B	Kernel initialized successfully.
Error Codes from Bundle Loader Module (INIT.PLM)	
10	Unable to allocate memory below 1MB.
11	Unable to allocate memory above 1MB.
12	Phoenix Dispatch Manager call to size/load module failed.
13	No bundle file found in BIOS image.
14	No ODI driver found in BIOS image.
15	Too many bundles found in BIOS image.
16	Bundle failed to load (bundle is probably corrupt).

Table B-1. ROMPilot BIOS Error Codes (continued)

Error Codes	Error Messages
Error Codes from Connection Manager (CONMNGR.PLM)	
18	Failed to register interface with RPC.
19	Protocol stack not bound to ODI driver.
1A	Unable to create thread.
1B	RomPilot shutdown for transition to DOS.
1C	RomPilot forced to shutdown by BIOS.
Error Codes from Export of NV Install Data (EXPVARS.PLM)	
20	Unable to allocate memory below 1MB.
21	Phoenix Dispatch Manager call to read NV install data failed.
22	Unable to allocate memory above 1MB.
23	Failed to export symbol.
24	Version mismatch between RomPilot and NV install data.
25	NV install data is marked as incomplete.
26	NV install data is missing RomPilot signature.
27	NV install data failed checksum.
Error Codes from Link Support Layer (LSL.PLM)	
28	LSL initialization failed.
Error Codes from Media Support Layer (MSM.PLM)	
30	Unable to register shutdown function.
31	Network card not initialized.
32	Appropriate board not found.
Error Codes from Protocol Stack (PSTACK.PLM)	
38	IP address is already in use.

Glossary

A

AC
(Alternating Current) The type of current available in wall outlets. All computers must convert alternating current to direct current to operate. See also DC.

address
A label, name, or number that identifies a location in computer memory.

ASCII
(American Standard Code for Information Interchange) A standard number assigned to each of the alphanumeric characters and keyboard control code keys to enable the transfer of information between different types of computers and peripherals.

B

backplane slot
A connector on the backplane board in desktop computers and expansion boxes that allows you to install circuit cards.

backup
A copy of data for safe-keeping. The data is copied from computer memory or disk to a floppy disk, magnetic tape, or other media.

backup battery
The battery in your computer that maintains the real-time clock and the configuration information when the computer's power is removed.

base memory
An area of memory between 0 and 640 kilobytes.

baud rate
The speed with which data is transmitted during serial communication. The computer's operating system and software program must be configured for the same baud rate as the communication device, such as a serial printer. See also bps.

BIOS
(Basic Input/Output System) A program stored in flash EPROM or ROM that controls the keyboard, disk drives, video monitor, and other devices. See also flash EPROM, EPROM, and ROM.

bit
Derived from BInary digiT, a bit is the smallest unit of information a computer handles. See also byte.

BMC
(Baseboard Management Controller) Contains all of the server management functions. One major function of the BMC is to monitor system management events and log their occurrence in the System Event Log (SEL).

boot
The process of loading the operating system into memory.

bps
(bits per second) The number of bits transferred in one second during serial communication, such as modem transmission.

byte
A group of eight bits.

C

cache memory
A very fast, limited portion of RAM set aside for temporary storage of data for direct access by the microprocessor.

CD-ROM drive
(Compact Disk ROM drive) A type of mass storage device that reads information from a compact disk.

Centronics port
An industry standard parallel port. See also parallel port.

CGA
(Color Graphics Adapter) A type of video display system that provides low-resolution text and graphics on TTL monochrome and color monitors.

CMOS
(Complimentary Metal-Oxide Semiconductor) A type of low-power integrated circuit used in computers. See also TTL.

COM1 or COM2
The name you can assign a serial port to set or change its address. See also serial port.

command
An instruction that directs the computer to perform a particular operation.

configuration
The way in which a computer is set up to operate. Some configurable options include CPU speed, serial port designation, and memory allocation.

CPU
(Central Processing Unit) See microprocessor.

CRT
(Cathode-Ray Tube) The type of video display used in monitors for desktop computers.

D

DC
(Direct Current) The type of current available in the rechargeable battery packs used in portable computers. See also AC.

default
The factory setting your computer uses unless you instruct it otherwise. For example, when powering up, the computer will boot from the default drive.

density
The capacity of information (bytes) that can be packed onto a storage device, such as a floppy disk.

device driver
A software program that a computer must use to recognize and operate certain hardware, such as a mouse or a video monitor.

disk drive
A device that stores data on a hard or floppy disk. A floppy disk drive requires a floppy disk to be inserted; a hard disk drive has a permanently encased hard disk.

DOS
(Disk Operating System) See operating system.

DRAM
(Dynamic RAM) See RAM.

E

ECC
(Error Checking and Correction) A method of detecting and correcting errors.

EEPROM
(Electrically Erasable Programmable Read-Only Memory) A type of memory device that stores password and configuration information.

EGA
(Enhanced Graphics Adapter) A type of video display system that provides medium-resolution text and graphics on TTL monochrome, color, and enhanced color monitors.

EMP
The Emergency Management Port (EMP) provides an interface to the console manager. This interface allows remote server management via a modem or direct connection.

EMS
(Expanded Memory Specification) A method of accessing memory beyond the 640K limit of DOS by exchanging data in and out of main memory at high speeds. Some software requires EMS to operate.

EPROM
(Erasable Programmable Read-Only Memory) A type of memory device that is usually used to store system BIOS code. This code can be erased with ultraviolet light, but is not lost when the computer is powered off. See also flash EPROM and ROM.

expansion slot
See backplane slot.

extended memory
The protected memory above 1M that is directly accessible by the microprocessor through certain utilities and operating systems.

F

fault tolerance
The capability of a system to respond smoothly to an unexpected hardware or software failure. There are many levels of fault tolerance, of which the lowest is having the ability to continue operation in the event of a power failure. Fault-tolerant computer systems mirror all operations, which means that every operation is performed on two or more duplicate systems at all times, so that if one fails another takes over.

flash EPROM
A type of memory device that is usually used to store system BIOS code. This code can be replaced with updated code from a floppy disk, but is not lost when the computer is powered off. See also EPROM and ROM.

floppy disk drive
See disk drive.

format
The process used to organize a hard or floppy disk into sectors so it can accept data. Formatting destroys all previous data on the disk.

FRB
(Fault Resilient Boot) Is a server management feature. FRB attempts to boot a system using the alternate processor or DIMM.

G

(Gigabyte)
1,073,741,824 bytes. See also byte.

H

hard disk drive
See disk drive.

hardware
The physical parts of your computer, including the keyboard, monitor, disk drives, cables, and circuit cards.

hot swap
A method used to insert or remove SCSI disk drives into or from an operating bus. This method is typically used in RAID subsystems. When used in non-RAID subsystems the operating system must typically be restarted.

I

IC
(Integrated Circuit) An electronic device that contains miniaturized circuitry.

IDE
(Integrated Drive Electronics) A type of hard disk drive with the control circuitry located inside the disk drive rather than on a drive controller card.

interface.
A connection between the computer and a peripheral device that enables them to exchange data. See also parallel port and serial port.

ISA
(Industry Standard Architecture) An industry standard for computers and circuit cards that transfer 16 bits of data at a time.

J

jumper
A small electrical connector used for configuration on some computer hardware.

K

(Kilobyte)
1,024 bytes. See also byte.

L

LAN
(Local Area Network) A group of computers linked together within a limited area to exchange information.

LCD
(Liquid Crystal Display) The type of video display used in portable computers.

LED
(Light-Emitting Diode) A small electronic device that glows when current flows through it.

LPT1 or LPT2
The name you can assign a parallel port to specify its address. See also parallel port.

LVD
Super-fast Ultra 2 SCSI Low Voltage Differential (LVD) Parallel SCSI Interface. A new SCSI interface that provides greater I/O bandwidth, device connectivity, data reliability, and longer cable lengths for Ultra2 SCSI hard disk drives. Note that in order to achieve LVD performance all devices including cable, controller, and drive must support LVD.

M

(Megabyte)
1,048,576 bytes. See also byte.

memory
The circuitry in your computer that stores data and programs. See also EMS, extended memory, RAM, and ROM.

microprocessor
The integrated circuit that processes data and controls the basic functions of the computer.

modem
A device used to exchange information with other computers over telephone or data lines.

module
A circuit board that plugs into a dedicated connector on the system board in your computer.

mouse
A small input device that you guide on a flat surface to control the cursor movement and operation of the computer when using certain software programs.

N

NVRAM
(Nonvolatile RAM) A type of RAM that retains its contents even after the computer is powered off. This memory stores EISA configuration information. See also RAM and SRAM.

O

operating system
A set of programs that provides the interface between other software programs and the computer.

P

parallel port
The connector on the back of your computer that allows the transfer of data between the computer and a parallel device, such as a parallel printer.

partition
The process of dividing the storage space on a hard disk into separate areas so that the operating system treats them as separate disk drives.

password
A security feature that prevents an unauthorized user from operating your computer. See also EEPROM.

PCI
Peripheral Component Interconnect. PCI is a high-performance peripherals I/O bus supporting data transfers of up to 528MB per second.

Pentium
A type of microprocessor, with a built-in math coprocessor, cache memory, and memory and bus controllers, that processes and communicates 32 bits of data at a time. This microprocessor also contains power management capabilities.

peripheral
A device connected to and controlled by the computer, such as an external disk drive or a printer.

pixel
The smallest element that is visible on a video display. The resolution of a video display system is measured in pixels.

PnP
(Plug-n-Play) Plug-and-play is the ability to plug a device into a computer and have the computer recognize that the device is there. The user doesn't have to tell the computer.

POST
Power-On-Self-Test.

R

RAM
(Random-Access Memory) A temporary storage area for data and programs. This type of memory must be periodically refreshed to maintain valid data, and is lost when the computer is powered off. See also NVRAM and SRAM.

real-time clock
The IC in your computer that maintains the time and date.

registered SDRAM
A type of SDRAM containing an additional buffer that allows memory to run faster. See also RAM and SDRAM.

ROM
(Read-Only Memory) A type of memory device that usually is used to store system BIOS code. This code cannot be altered and is not lost when the computer is powered off. See also BIOS, EPROM, and flash EPROM.

RS-232C port
An industry standard serial port. See also serial port.

S

SAF-TE
(SCSI Accessed Fault Tolerant Enclosure) A specification for monitoring the state of the drives and enclosure environment (fan, power supply, temperature, etc.) using the SCSI bus to indicate faults.

save
To store information on a floppy disk, hard disk, magnetic tape, or some other permanent storage device.

SCSI
(Small Computer System Interface) An industry standard interface that provides high-speed access to tape drives, hard disk drives, and other peripheral devices.

SDRAM
(Synchronous DRAM) A type of DRAM that runs at faster clock speeds than conventional memory. See also DRAM and registered SDRAM.

SEL
(System Event Log) A record of system management events. The information stored includes the name of the event, the date and time the event occurred and data pertinent to the event. Event data may include POST error codes that reflect hardware errors or software conflicts within the system.

serial communication
Information sent sequentially, one bit at a time.

serial port
The connector on the back of your computer that allows the transfer of data between the computer and a serial device, such as a mouse, a modem, or a serial printer.

setup program
The program that you use to change the configuration of some ISA desktop and notebook computers. This program also contains information about the hardware in the computer.

SMI
(System Management Interrupt).

software
Programs with specific functions, such as word processing, data base management, communications, and operating system.

SRAM
(Static RAM) A temporary storage area for data and programs. This type of memory does not need to be refreshed, but it is lost when the computer is powered off. See also NVRAM and RAM.

SVGA
(Super VGA) A type of video display system that provides very high-resolution text and graphics on analog color monitors.

system board
The main circuit board in your computer. It contains most of the connectors and ports.

T

tape drive
A type of storage device using magnetic tape.

TTL
(Transistor-Transistor Logic) A type of integrated circuit used in computers. See also CMOS.

U

ultra 160/m SCSI
Ultra 160/m is a parallel SCSI interface based on Ultra3 SCSI technology. This interface features data transfer speeds up to 160MB/second (double-edge clocking), cyclical redundancy checking (CRC) providing higher levels of data reliability, and domain validation that detects the configuration of the SCSI bus and automatically tests and adjusts the SCSI bus transfer rate to optimize interoperability. Note that the Ultra 160/m uses the standard Ultra2 LVD cabling and termination, making it backward compatible for easy implementation.

V

VGA
(Video Graphics Array) A type of video display system that provides high-resolution text and graphics on analog color monitors.

W

WOL
(Wake-On-LAN) A feature that provides the ability to remotely wake a sleeping (powered off) system through a network connection.

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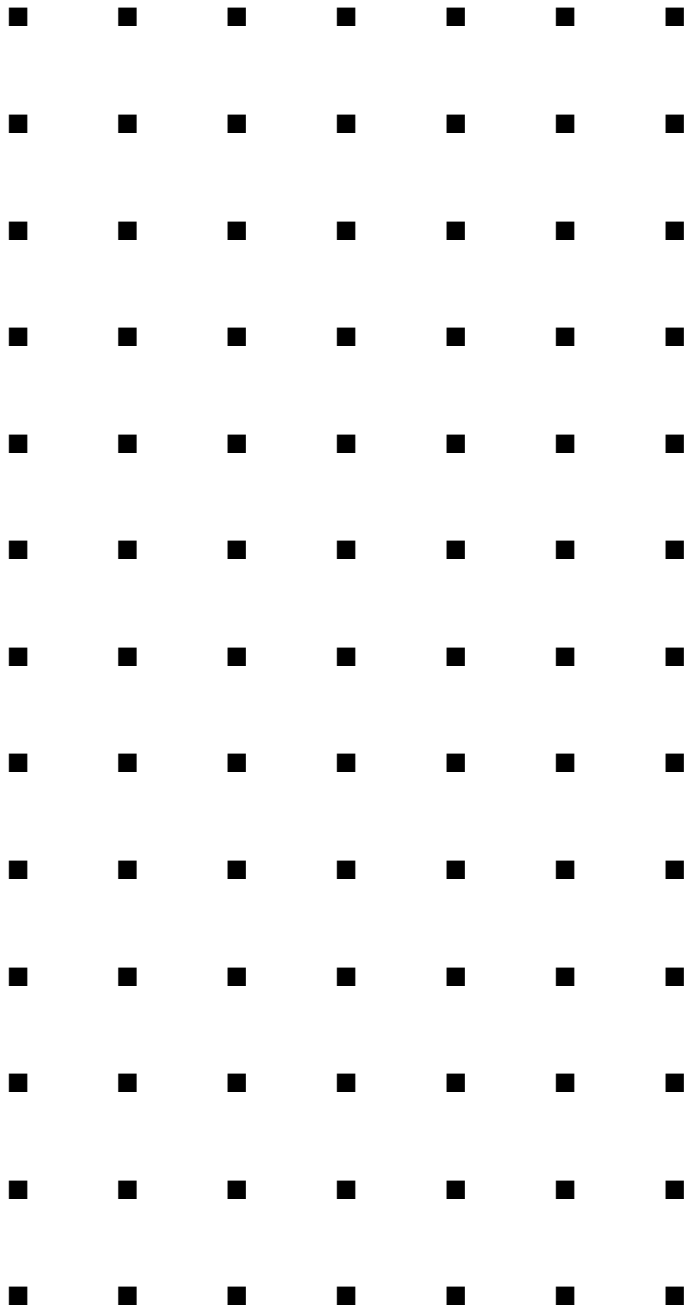

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